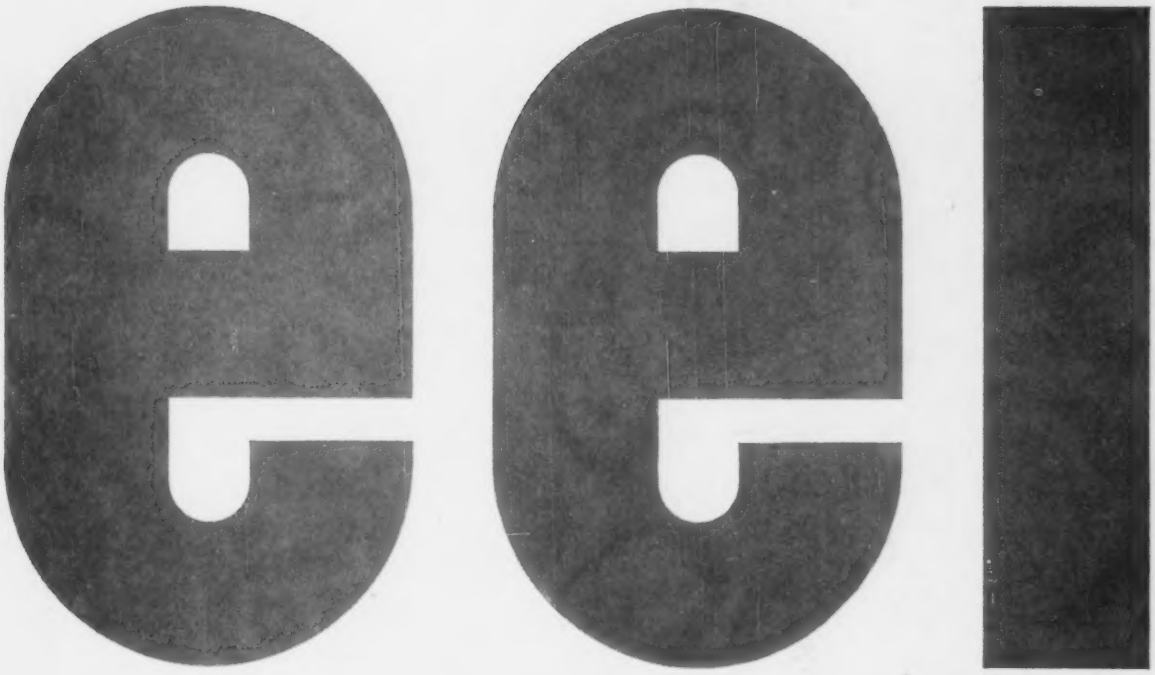
The Electrical Industry's Weekly Magazine

June 20, 1960

Electrical World

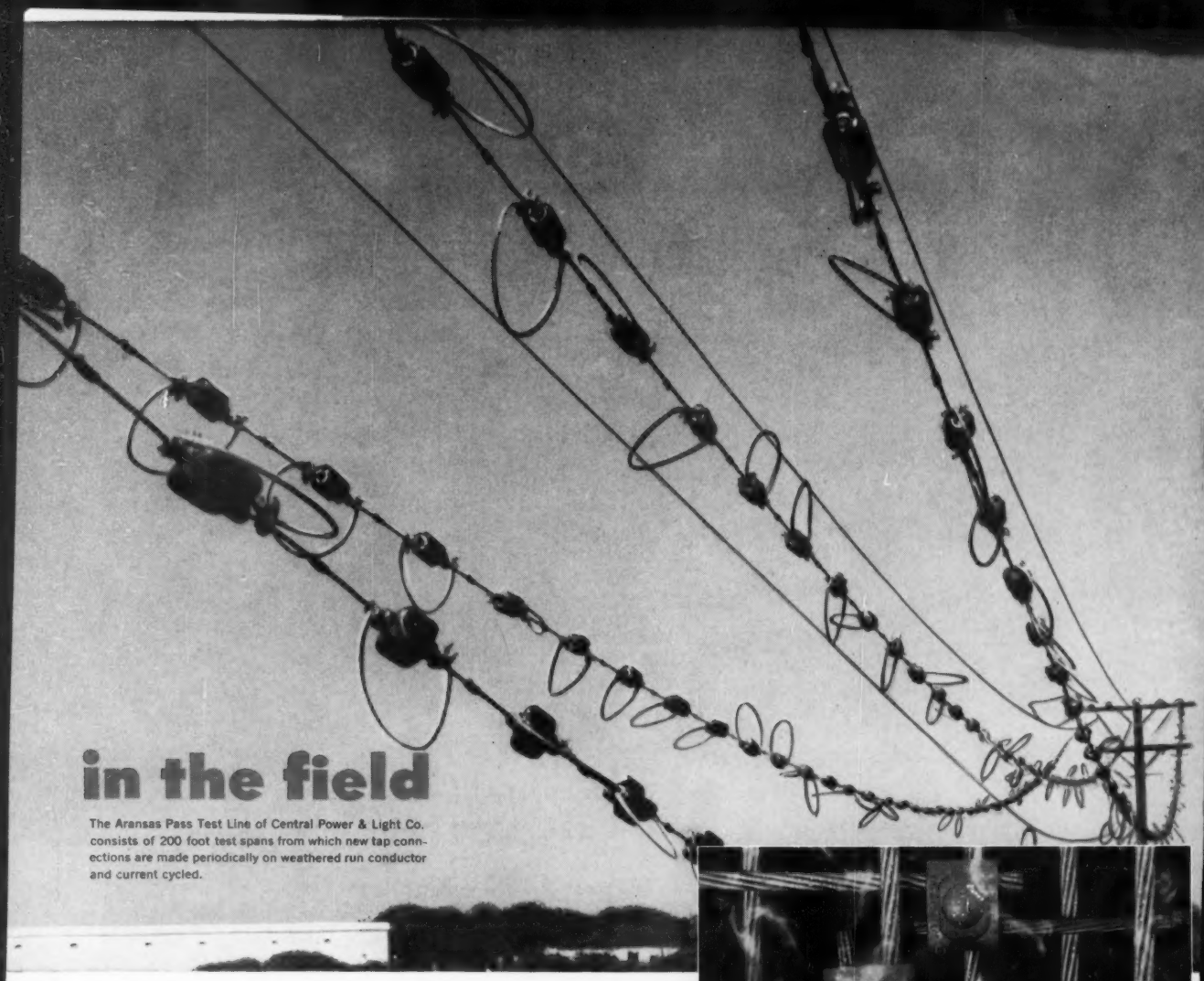
Price 50 Cents

A McGraw-Hill Publication



28TH ANNUAL CONVENTION HIGHLIGHTS U. S. WORLD LEAD IN ELECTRIC POWER

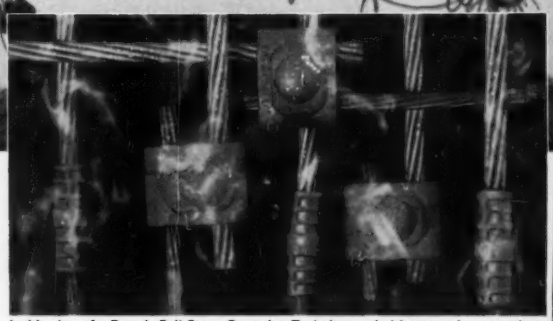
CL&P'S SHERMAN R. KNAPP IS ELECTED PRESIDENT...PAGE 93



in the field

The Aransas Pass Test Line of Central Power & Light Co. consists of 200 foot test spans from which new tap connections are made periodically on weathered run conductor and current cycled.

...and in the lab



Inside view of a Burndy Salt Spray Corrosion Test shows what happens to connectors and cables of dissimilar metals when exposed to severe atmospheric conditions.

BURNDY RESEARCH

CONCENTRATES ON THE DEVELOPMENT OF BETTER ELECTRICAL CONNECTIONS

Burndy's field research with Central Power & Light on weathered overhead lines is expected to provide valuable information on connector installation practices, and possible data for the future design of connectors and cables with longer and more predictable life spans.

Burndy's research has produced: Massive Aluminum Tap—TAPIT®; Single Sleeve ACSR Splice—UNISPLICE$^{T.M.}$; Pre-insulated Service Entrance Splice—INSULINK®. Burndy research will continue to concentrate on the development of better electrical connections.

BURNDY

58-18

NORWALK, CONNECT. • BICC—BURNDY Ltd., Lancs., England • In Continental Europe: Antwerp, Belgium • TORONTO, CANADA

Electrical World

Vol. 153, No. 25 JUNE 20, 1960

Published for 86 years for those engaged in the business of generating, transmitting, distributing, or applying electric power

In This Week's Issue

CURRENT EVENTS

Court Stops Work on Enrico Fermi

Atomic Energy Commission is told it should not have approved location of the nuclear plant.....p 82

MANAGEMENT

Stronger Sales Lift Business Hopes

Gains in autos and retail trade ease anxiety over the year's totals, although doubts linger on.....p 177

TRANSMISSION

Conductors Selected for 460-Kv Line

P. L. Lumnitzer, Pennsylvania Electric Co, N. K. Barr, Kaiser Aluminum & Chemical Sales, Inc, and R. E. Larson, Aluminum Co of America

Penelec EHV project will test five expanded ACSR conductors when energized this summer.....p 88

A Staff Report

EEI 28th Annual Convention

The 28th annual convention of Edison Electric Institute was held earlier this month (June 6-8) in Atlantic City, N. J. The twelve-page report covers all the convention's highlights. The meeting's theme—"Leading the World in Electric Power—The American Way"—made its impress on most of the speakers and the subjects about which they spoke. The problems of government encroachment, financing, growth, sales, engineering, rates, safety, and system planning were given careful examination by speakers and conferees. The new president of EEI is Sherman R. Knapp, president of Connecticut L&P.

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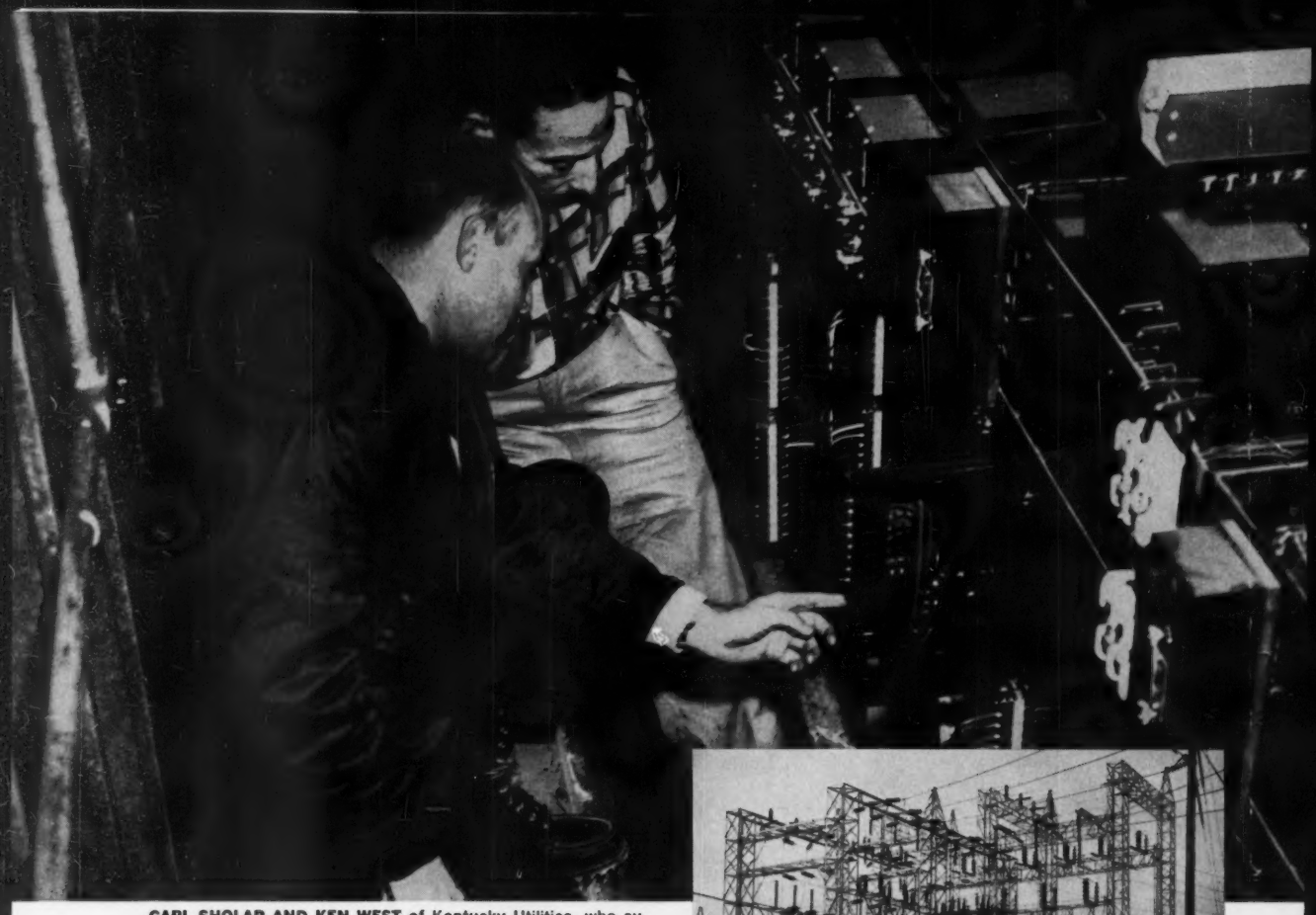
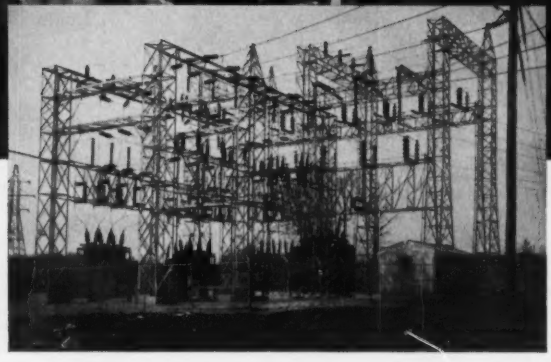


CARL SHOLAR AND KEN WEST of Kentucky Utilities, who supervised installation of all cables at the new Walker Substation, examine terminations of some of the Okonite control cable in the station. In the foreground, Mr. Sholar points to Okolite-Okoprene aerial cable which goes to the Earlington Substation.



Cable'bility at work

Kentucky Utilities chooses Okonite control cable on basis of performance record

Cable'bility (cā'ble·bil'·i·ty) *new word. Noun.* **1.** Ability to design and manufacture electrical cables that give outstanding performance. **2.** Having long background and wide experience in cable research and application. **3.** Possessing keen understanding of customers' problems. Implies eagerness to serve faithfully and dedication to progress. **Syn.** The Okonite Company.

Kentucky Utilities chose Okonite control cable for its new 161 to 69 kv substation one-half mile west of Earlington, Kentucky, and used it in many ways . . . underground in ducts, in conduit and aerially on a messenger.

Okonite's service record in other Kentucky Utilities installations was the prime factor in specification of the control cable for Walker Substation. Time after time, in recent years, the utility has purchased Okonite control cable because of satisfaction with its performance.

Another important factor to Kentucky Utilities was that Okonite manufactured the cable with colored neoprene on each conductor for easy coding. (Included in the installation at Walker are Okolite-Okoprene aerial control cables, Watertite-Okoprene control cables and Okoseal 200 PVC insulated switchboard cable.)

Okonite can help *you*, too, in meeting the exact requirements of your job, from manufacture through installation. To help you specify the best cable for your important power and control needs, contact your Okonite representative or write for Bulletin EW-1117, "How To Choose Insulated Cable." The Okonite Company, Subsidiary of Kennecott Copper Corporation, Passaic, N. J.

7251

***where there's electrical power . . . there's* OKONITE CABLE**

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Vol. 153, No. 25, June 20, 1960

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LETTERS

Compliments on Atomic Power Report

To the Editor:

I want to compliment you and Electrical World on your "Fifth Nuclear Power Report" published in the May 16th issue.

This is the most complete presentation of nuclear power data I have seen and you have done a fine job.

George Bisset
Senior Vice President
Potomac Electric Power Co
Washington, D. C.

Praise for Data Processing Study

To the Editor:

I would like to compliment you for the effort that was necessary to compile your special report regarding Electronic Data Processing in the March 28th issue of Electrical World. From my own experience in data processing I realize yours was a tedious task which deserves much praise.

B. D. Johnson
The Burroughs Corp
Indianapolis 4, Ind.

Small System Manager Writes

To the Editor:

CONGRATULATIONS ON SMALL SYSTEMS REPORT (EW, May 30). . . .

Edward C. Schlender,
General Manager
Raft River Rural Electric Cooperative, Inc
Malta, Idaho

▶ *Thanks, Readers Bisset, Johnson, and Schlender, for your very kind and thoughtful comments. All of the three reports mentioned are among our major efforts of the year. We thank other readers, too, who have expressed their appreciation by calling or telling us in person.*

Correct Name, Please

To the Editor:

We regret, of course, the misspelling of the name of our company on page 11 of your May 23rd issue. We have known Electrical World people for many years.

J. Robert Groff
President & General Manager
The James Leffel & Co
Springfield, Ohio

This column is your forum in Electrical World. We invite your comments, suggestions, criticism. Correspondence should be addressed to "Letters Editor," Electrical World, 330 W 42nd St, New York 36, N. Y.

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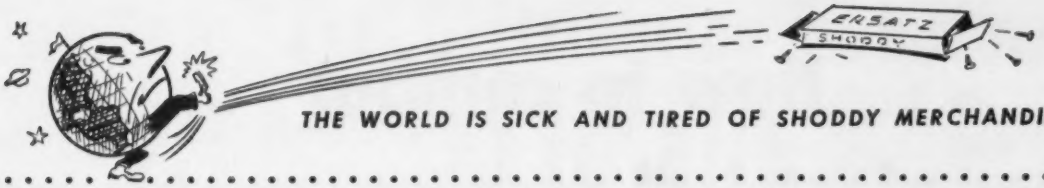

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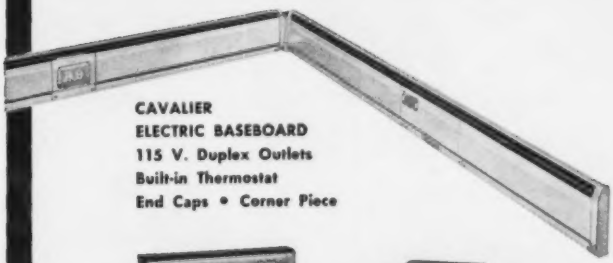
happy, satisfied customers

boost your business more than anything else



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115 V. Duplex Outlets
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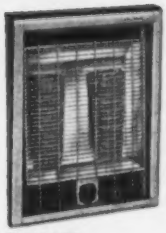
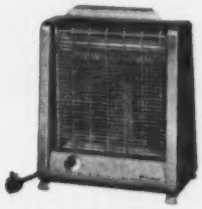
End Caps • Corner Piece

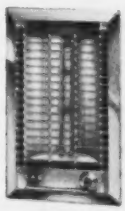


CAVALIER
WALL INSERT
1 to 5 KW



CAVALIER PORTABLE
2, 3, 4 KW

CAVALIER
CABLE
HEAT



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Automatic and
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CAVALIER heating equipment has the genuine quality that sells, pleases customers and eliminates costly service calls.

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How to combat these electrical raceway problems

GALVANIC CORROSION *USE RIGID STEEL CONDUIT.* Its zinc coating guards it thoroughly against corrosive action when buried in concrete or soil. And it is fully compatible with all common building materials.

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EXPENSIVE UPKEEP *USE RIGID STEEL CONDUIT.* It outlasts any number of rewirings. Its tightly bonded zinc and enamel coatings remain attractive throughout its service life.

PROTECTION OF EXPOSED RUNS *USE RIGID STEEL CONDUIT.* The strength of steel resists damage from moving objects, thus providing electrical wiring with the most thorough and dependable mechanical protection available.

REWIRING DIFFICULTIES *USE RIGID STEEL CONDUIT.* Fish tapes cannot damage its smooth, hard interior, and wiring is easy to pull in. Easy to pull out and replace, too, even many years after installation. Altering the wiring system is simple and quick where spare conduit capacity has been provided.

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SPECIAL INSTALLATION EQUIPMENT *USE RIGID STEEL CONDUIT.* Electrical contractors are used to working with steel conduit, and already own—and know how to use—the necessary installation equipment. Steel conduit requires no special tools nor handling techniques.

Steel

For strength
... economy
... versatility

First in wiring protection for over 50 years, rigid steel conduit is the strongest answer to all your electrical raceway problems. Your electrical distributor will be glad to supply the details. Ask him about steel conduit soon.

BETHLEHEM STEEL COMPANY, BETHLEHEM, PA.
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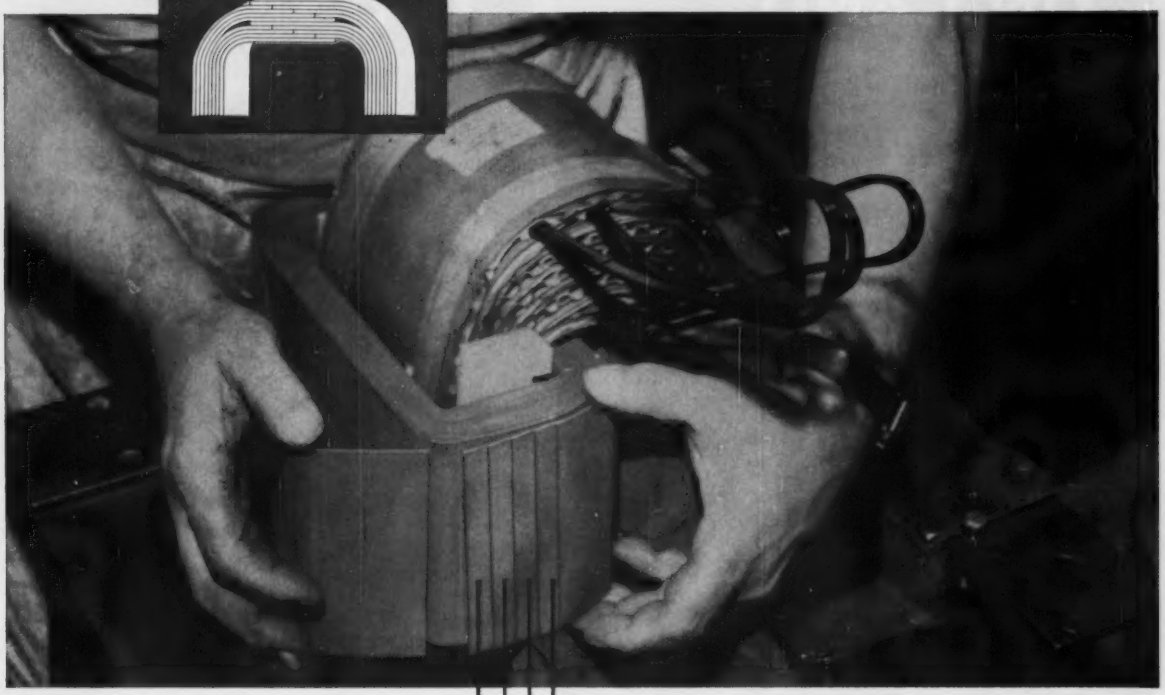
BETHLEHEM STEEL

BETHLEHEM STEEL

The Pole Star® Distribution Transformer Core has a new ECHELON LAP



result:

- LOWER LOSSES
- LOWER EXCITING CURRENT
- LOWER IMPEDANCE
- IMPROVED REGULATION

When the Pole Star lap-on-top core was introduced by Pennsylvania Transformer in 1947, its electrical efficiency represented a major improvement over previous standards for distribution transformers. This leadership has been maintained for more than a decade.

Now, Pennsylvania again takes a long step forward—by giving the Pole Star core a "new look" that reduces total losses as much as 9%, and exciting current as much as 46%. The new design also provides improved regulation, and lower impedance.

New Compact Design Retains Service-Proved Principles

In the new, patented design, the lamination laps (still on top of the core) have been arranged in an "echelon" pattern that results in a highly compact, efficient structure with outstanding magnetic properties. Laminations nest snugly together, with no appreciable build-up of steel at the top of the core.

As in the original, time-proved Pole Star core, laminations are individually lapped as the core is built into the coil. Each lamination thus forms its own magnetic path, and no flux has to cross from one turn to the next.

Electrical Data Now Available

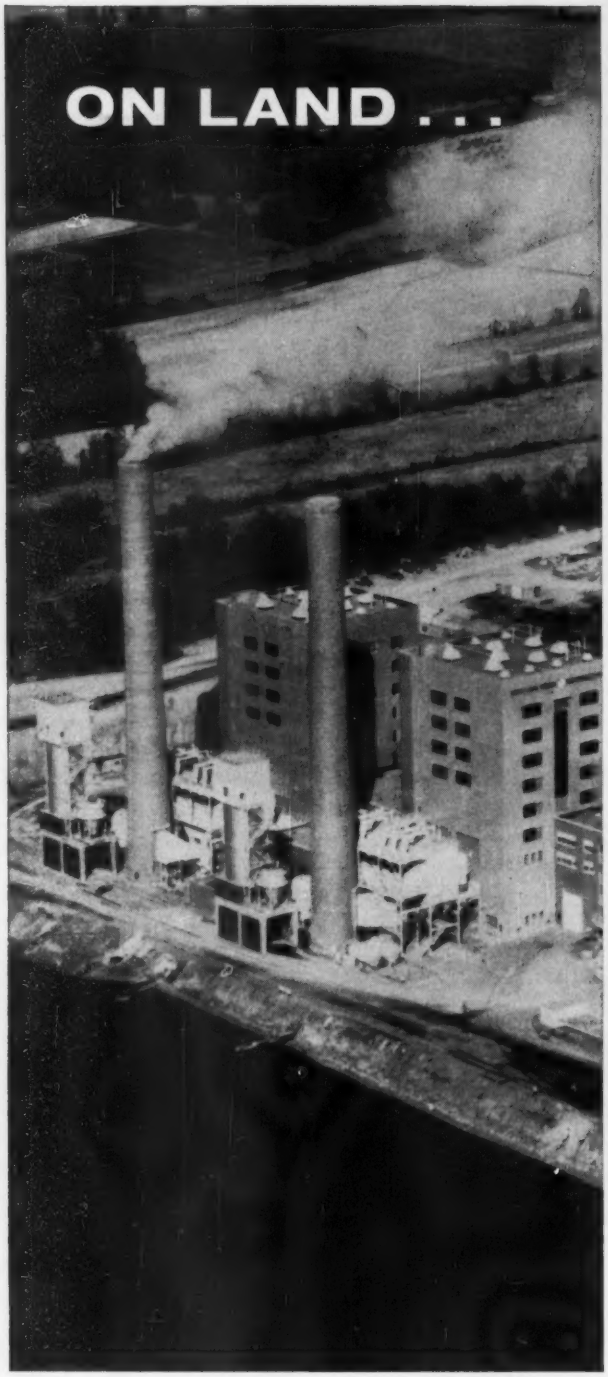
Use of the new "echelon" core is being extended throughout the entire line of Pole Star Distribution Transformers. For electrical data on specific units, write to Distribution Sales, Pennsylvania Transformer Div., McGraw-Edison Co., Canonsburg, Pa.

McGRAW-EDISON

Example: 7200-volt line; average for all kva sizes

Characteristic	% Improvement over Previously Published Data
Total Loss	7%
Iron Loss	14%
Copper Loss	4%
Exciting Current	39%
Impedance	10%

PENNSYLVANIA DISTRIBUTION TRANSFORMERS

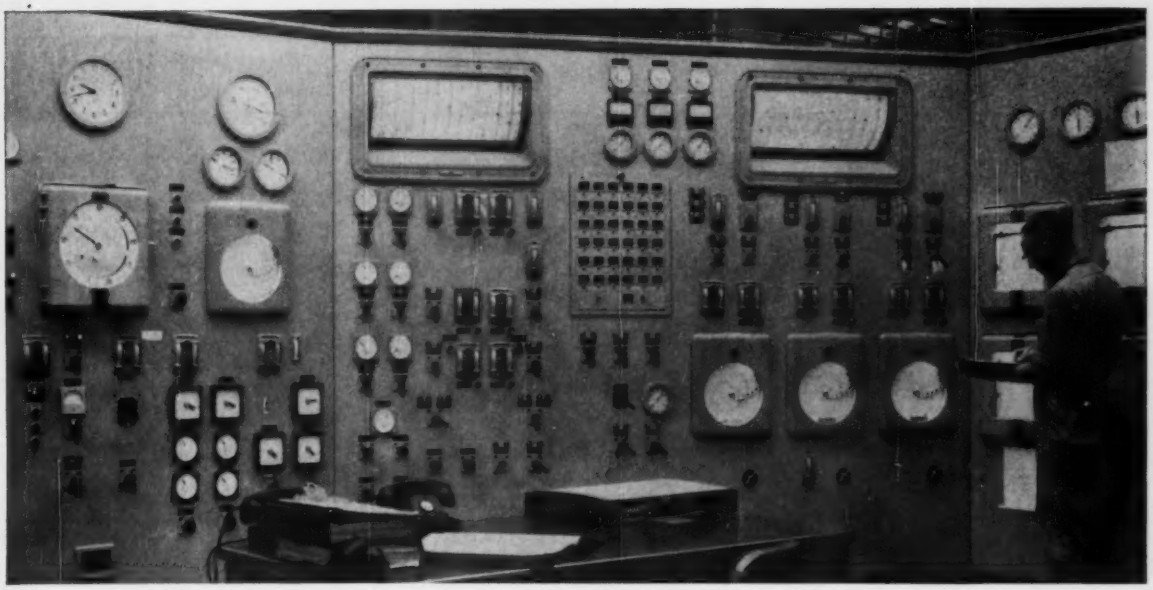


At Milliken Station, New York State Electric and Gas Corporation, Bailey METROTYPE Information Systems monitor operating conditions and gather performance data. The monitoring system continuously scans all points and prints out any off-normal measurements while the performance system makes hourly logs and simultaneously produces punched tape for future use in standard digital computing facilities.

The NS Savannah, first Nuclear merchant ship, is controlled from a "Bailey Board" which includes Nuclear Instrumentation and Bailey Reactor Controls as well as Bailey Steam Plant Instruments and Controls.

This is the control center for the first commercial super-critical pressure, steam-electric unit in America. Here at the Philo plant of the Ohio Power Company, on the American Electric Power Company System, Bailey controls maintain the desired rate of steam generation, final steam temperature and optimum combustion conditions.

IT'S BAILEY. . .



for the latest and safest instruments and controls for nuclear and conventional power plants!

Many of the power plants of the future will have controls and instruments designed and built by Bailey. There are two reasons: Bailey's continuing research and development toward the latest equipment for industry's needs; Bailey's 40-year association with the hardware and economic requirements of the industry.

If you are planning new or improved power plant facilities, call on Bailey engineers to insure that your system will have the *proper balance both as to economics and needs . . . that there will not be the unnecessary expense of over-instrumentation or control . . . nor the duplication of equipment functions.*

Call on Bailey for primary sensing devices, indicators, loggers, control units, panels, data handling equipment, computers for performance analysis, and supervisory controls. You'll find designs ranging from conventional to the most sophisticated . . . mechanical, pneumatic, electric and electronic, including solid state.

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A143-2

Instruments and controls for power and process

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Name of Coal	Character	Mine	Seam	County & State
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Colver		Colver	"B"	Cambria (Pa.)
Indian Creek	Central Pennsylvania Medium Volatile	Melcroft	"B" or Miller	Fayette (Pa.)
Federal	Northern West Virginia	Federal #1	Pittsburgh	Marion (W. Va.)
Beckley	Southern West Virginia Low Volatile	Eccles #5	Beckley	Raleigh (W. Va.)
Sewell		Eccles #6	Sewell	Raleigh (W. Va.)
New River		Stotesbury #8	Pocahontas #4	Raleigh (W. Va.)
		Stotesbury #10	Pocahontas #4	Raleigh (W. Va.)
		Stotesbury #11	Pocahontas #4	Raleigh (W. Va.)
Pocahontas		Keystone	Pocahontas #3	McDowell (W. Va.)
Eagle	Southern West Virginia and Eastern Kentucky High Volatile	Beards Fork	Eagle	Fayette (W. Va.)
		Kopperston #1	Eagle	Wyoming (W. Va.)
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Wharton		Wharton #1	Hernshaw	Boone (W. Va.)
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BEACON COAL

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CAN GIVE YOU THE COAL YOU NEED

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Penna.	1	Egg; Stoker; M/R; N&S; Slack	2500	Sonman
C & I	1	N&S; Slack; Stoker; Nut	5000	Colver
B & O	1	M/R; N&S; Slack	1200	Indian Creek
Monongahela; B&O	3	Lump; Egg; Nut; Stoker; M/R N&S; Slack	12,500	Federal
C & O; N & W	7	Scr. M/R; Stove; N&S; Slack	2500	Beckley
C & O; N & W	7	Scr. M/R; Stove; N&S; Slack	1000	Sewell
C & O; N & W	7	Stoker; M/R; Slack	2000	New River
C & O; N & W	7	Stoker; N&S; Slack	2500	
N & W	7	M/R; Slack	1800	
N & W	7	Egg; Stove; Nut; Stoker; M/R; N&S; Slack	7500	Pocahontas
N & W	7	M/R; N&S	2900	Eagle
N & W	8	M/R; N&S; Slack	3500	
N & W	8	M/R; Nut; N&S; Slack	7000	No. 2 Gas
C & O	8	M/R; N&S	3500	Wharton
C & O	8	M/R; N&S	4000	

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For UNDERGROUND
Wagner SUBURBAN
PAD MOUNTED TRANSFORMERS
Available in single-phase, 25-167 Kva;
three-phase, 75-500 Kva.

DISTRIBUTION...

WAGNER SUB URBAN TRANSFORMERS

are safe... well-ventilated ...adaptable to future load growth

Plotting a new subdivision? Planning a new shopping center? Reworking, modernizing a distribution system? Write Wagner Sub-Urban Pad Mounted Transformers into your standards.

Wagner Sub-Urban Pad Mounted Transformers are designed to be used wherever underground distribution is necessary or desirable. They are ideal for use in residential areas. Compact in size, low in profile, they can be hidden behind plantings of shrubbery.

Safe to use? Certainly. A padlocked, tamperproof enclosure protects your equipment... protects people. The public is protected from exposed hot-lines... and, your crews are protected, too, by a door over the primary compartment which lets them work on the secondary without danger from high voltage.

Sub-Urban Transformers are well-ventilated... they can be loaded to capacity. When load growth makes it necessary, larger transformers can be quickly and easily installed to replace the original transformer units. These transformers normally require only routine maintenance. Due to better protection, far fewer faults occur in an underground system over a period of time than would generally occur in a comparable overhead system.

Get the whole story of Wagner Sub-Urban Transformers. Consult your nearby Wagner Sales Engineer, or write for Bulletin TU-148.

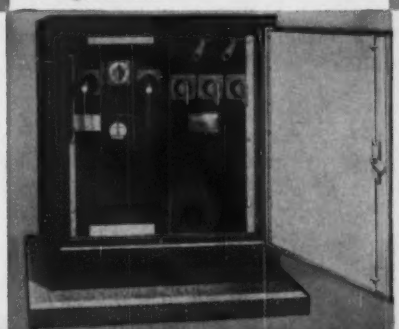
Wagner Electric Corporation

6456 PLYMOUTH AVE., ST. LOUIS 33, MISSOURI

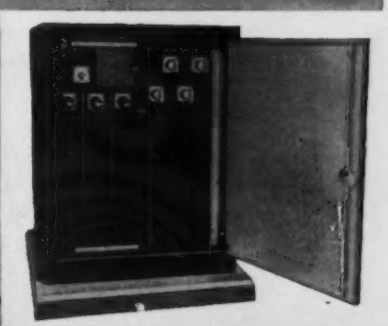
WT60-4

BUILT TO LAST—Tank is of heavy gauge sheet steel, with welded-on cover. Smoothly shaped radiators are welded to tank along their entire length. Complete special asphalt-type undercoating gives lasting protection against rust and corrosion.

SINGLE-PHASE—Terminal cabinet of a 100 Kva single-phase transformer. Barrier plates are provided between high voltage bushings and between high and low voltage compartments. Single-phase ratings from 25 through 167 Kva.



THREE-PHASE—Terminal cabinet of a 225 Kva three-phase Sub-Urban Transformer. High voltage tap changer is at the left side of the nameplate. Three-phase pad units are available in ratings from 75 through 500 Kva.



HOW SOUTHERN STATES' BV-33-F CUTOUT CLEARS RESTRICTED OR HIGH FAULTS WITH EQUAL DEPENDABILITY

The complexities of today's distribution systems present a real challenge to the designers of cutouts. Industry requirements call for interrupting capacities up to three times higher than a few years ago. And yet the cutout must clear restricted faults with equal ease and sureness.

Large bore tubes, vented freely at both ends, will clear extremely high faults easily. Small bore tubes, vented at one end, will clear low faults easily. The big problem is to do both.

The Southern States BV-33-F Heavy Duty Cutout clears the complete range of fault currents with equal dependability—without damage to the cutout.

What About Single-Venting?

In single vented cutouts, the rocket effect of the tube, as gases are ejected, must be considered. Some type of shock absorber to cushion the fuse holder, as it tends to thrust upward, must be provided. But so far no practical recoil mechanism has been devised that can fully absorb the violent recoil action. Thus a substantial amount of shock is transmitted to the mounting, insulator, bracket, and cross arm.

As interrupting capacities on single-vented cutouts are increased, bore diameters become critical. If it is large enough to handle high faults, it may provide only borderline protection on restricted faults. Resorting to some extraneous means, such as special types of fuse links, is a dangerous concession to security—as there is no assurance of proper fusing in the field.

What About Controlled Venting?

Providing a small vent hole in the top hardware to permit a limited amount of gas to escape is not the solution either. This practice was dropped by Southern States long ago, when it was found that the hole became enlarged after each operation, endangering proper clearance of low faults.

Here's the Answer

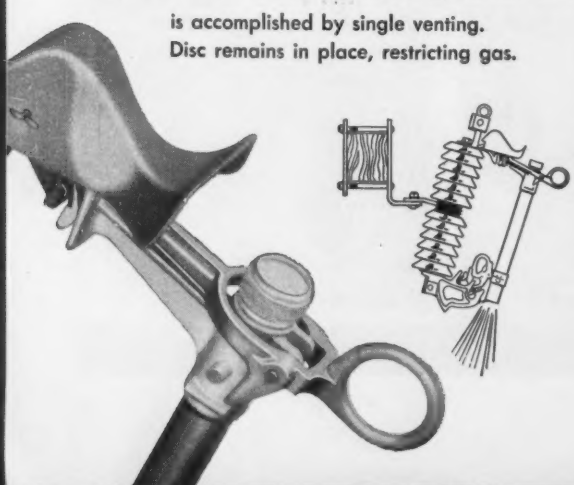
The BV-33-F offers all of the advantages and none of the disadvantages of single-venting or controlled-venting. This is accomplished with an economical expendable cap which confines gases on restricted faults, but allows them to double vent on high faults. Forces inside the tube are equal and opposite. Stress on the mounting is virtually eliminated. The cutout can operate time and time again without loss of efficiency. There is no built-in battering ram—no intricate mechanism, or springs to worry about. And any standard EEI-NEMA fuse link will provide positive operation every time.

Utilities throughout the nation are finding the BV-33-F a practical, workable solution to cutout problems.

Get complete information from your Southern States representative, or write for Bulletin 580C.

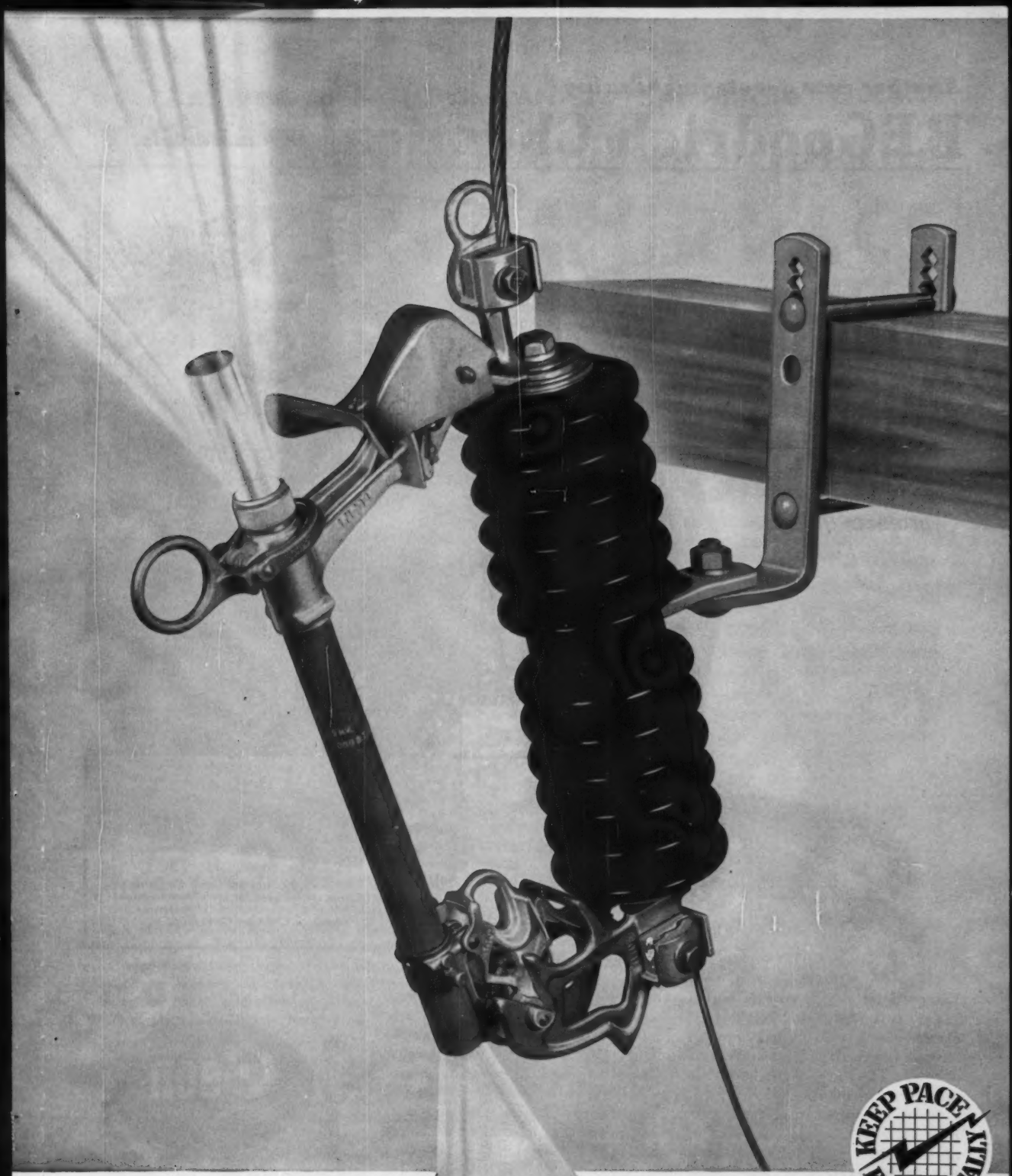
LOW FAULT CLEARANCE

is accomplished by single venting.
Disc remains in place, restricting gas.



HIGH FAULT CLEARANCE

is accomplished by double venting,
when disc is expelled.



SS

SOUTHERN STATES EQUIPMENT CORP.

HAMPTON, GEORGIA

IN CANADA Dominion Cutout Co., Ltd., Toronto

Another new development using

B.F.Goodrich Chemical *raw materials*

TOUGH JACKET OF GEON

protects direct burial wire

Direct burial wire made by Superior Cable Corporation with a jacket of Geon is also used for aerial constructions where burial is not practical. Geon vinyl materials are supplied by B.F.Goodrich Chemical Company.

Designed for use in outside buried plant, this wire must withstand severe mechanical and chemical stresses both during installation and service. That's why its jacket is made from Geon vinyl.

Geon is tough. Insulation compounds made from it are strong, abrasion-resistant and have excellent flexing properties. They resist flame, will not support combustion and are not affected by ordinary causes of corrosion—like oil, grease, chemicals or galvanic action. They retain these exceptional properties with age. They are lightweight, make wire easy to install or splice.

For more information about the many types of wire and cable covering made of Geon, write Dept. GX-7, B. F. Goodrich Chemical Co., 3135 Euclid Avenue, Cleveland 15, Ohio. Cable address: Goodchemco. In Canada: Kitchener, Ontario.

A TRADE MARK OF B.F.GOODRICH CHEMICAL COMPANY
Geon
VINYLS
A DIVISION OF THE B.F.GOODRICH COMPANY

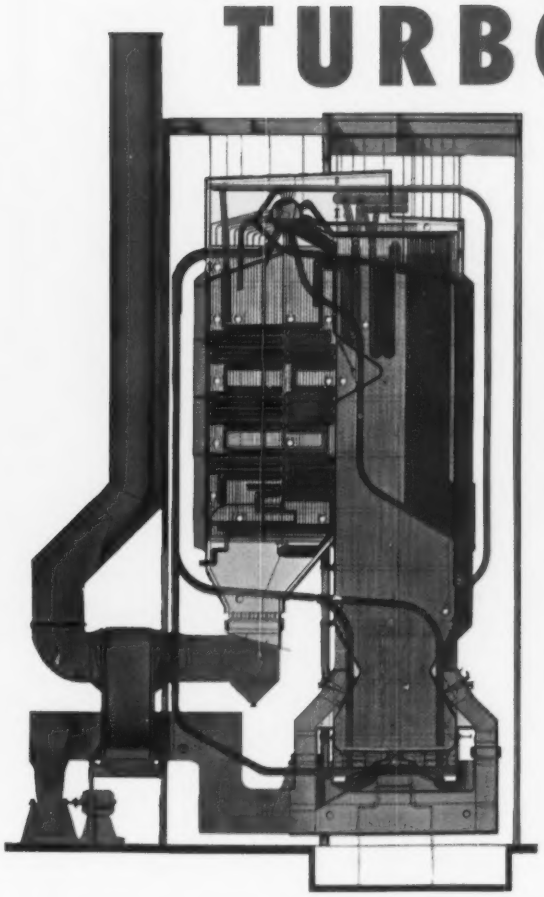
B.F.Goodrich Chemical Company
a division of The B.F.Goodrich Company

B.F.Goodrich

GEON vinyls • HYCAR rubber and latex • GOOD-RITE chemicals and plasticizers

Your Answer to Full Fuel Utilization in the '60's...

...RILEY Boilers With The TURBO FURNACE



Any fossil fuel can be fired in a Turbo Furnace singly and in any combination. Advanced operating and performance characteristics represent important strides in the art of fuel burning and steam generation. In recent years the Riley Turbo Furnace Boiler, a relatively new concept of boiler-furnace design, has been widely accepted by public utilities, manufacturing industries and their consulting engineers.

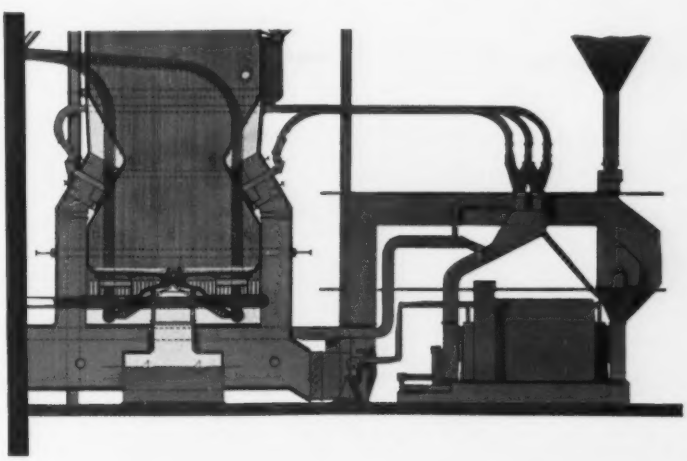
Turbo Furnace Boilers now in operation and under construction range in size from industrial type installations to high capacity central station units. Many Turbo Furnace Boilers are pressurized. Some are designed to fire coal, oil and gas separately or in any combination depending on B.T.U. cost of fuel.

Coal fired Turbo Furnace Boilers have these advantages: the elimination of the problem and cost of flyash disposal, the elimination of slag blowers, the ability to tap slag through a wide load range. Four Turbo Furnace Boilers are successfully firing fluid coke, which is handled as a pulverized fuel.

Many boilers of this design were purchased in anticipation of a changing fuel market because the design offers a simple low cost means of transition from one fuel to another.

The 1,650,000 lb/hr Turbo Furnace reheat boiler design for Louisiana Power and Light Company's new Little Gypsy Steam Electric Station . . . pioneer in complete automatic operation. Boiler operation at 2350 psig, 1005 F. superheat, reheat; pressurized.

Because the basic design of the Riley Turbo Furnace Boiler is suited to firing a wide variety of fuels, a boiler initially installed to burn oil and gas requires little alteration to equip it to burn pulverized coal. The design at right is a boiler originally installed for oil and gas. Many of the provisions for pulverized coal firing are accomplished externally while the boiler is kept in service on oil or gas.



A careful survey of your plant by a qualified consulting engineer could show ways of making substantial savings in power costs.

RILEY

STEAM GENERATING & FUEL BURNING EQUIPMENT

Here Are Some Desirable Characteristics You'll Find In A Riley Turbo Furnace Boiler

Simplified Steam Temperature Control

Performance varies little with type and grade of fuel being burned. Furnace exit temperature is lower than for horizontally fired boilers of equal heat release rates because heat absorbing surfaces are used more effectively. This simplifies steam temperature control.

Reduces Flyash Problems

Reinjection of flyash and continuous molten ash discharge eliminate costly flyash collection and disposal problems. Flyash combustible losses are eliminated. Some installations receive flyash from adjacent dry bottom units for disposal in the Turbo Furnace.

Reduction of Air Pollution

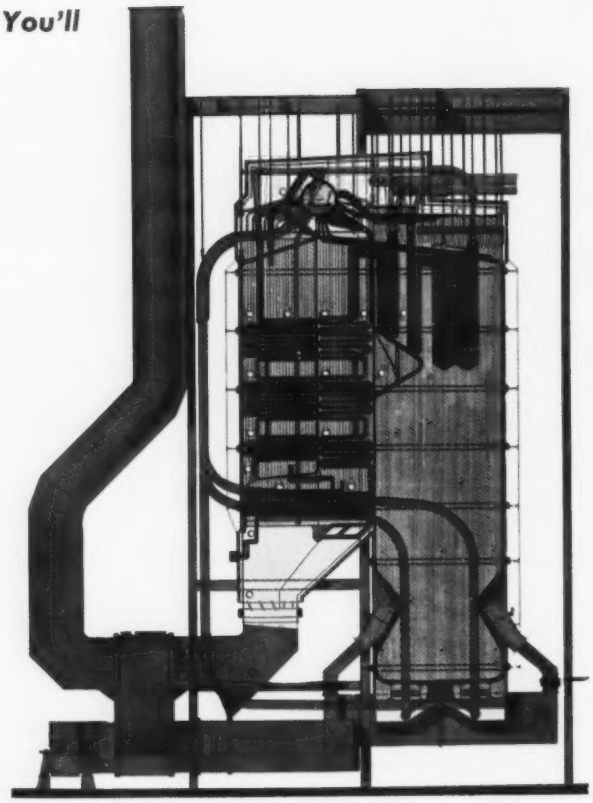
Because of the burning method, flue gases contain lower quantities of objectionable oxides of nitrogen.

Continuous Slag Tapping At Low Loads

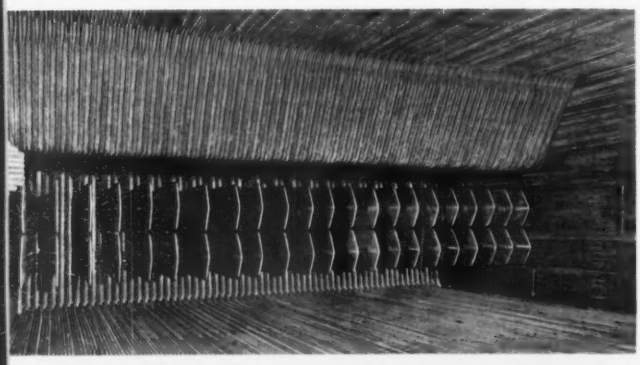
Burners are directed downward and fire on the floor around the tap hole assuring tapping at low load operation and making possible the use of higher fusion coals. Continuous flow of slag has been obtained at 25% of maximum continuous rating.

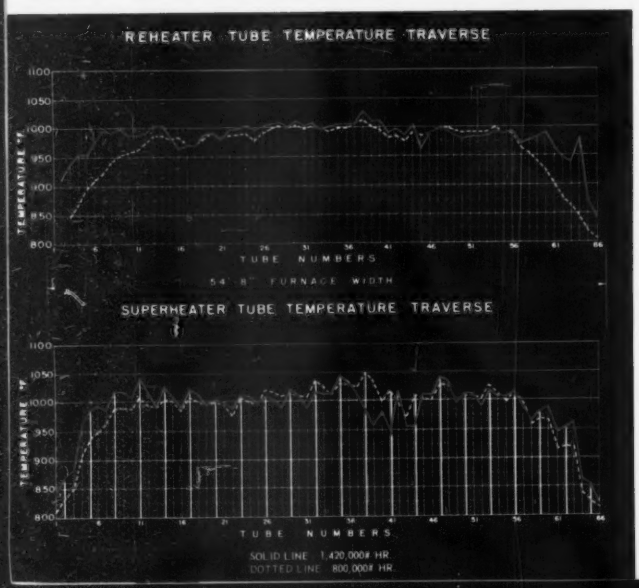
No Furnace Wall Deslaggers are Normally Required

Because of high ash retention in the bottom and the uniform vertical gas flow pattern furnace wall slagging is substantially eliminated.



The 1,550,000 lb/hr Turbo Furnace Boiler at Louisiana Power & Light Company's Sterlington (La.) Steam Electric Station, 2125 psig, 1005/1005 F pressurized. At left—View across 55 foot wide furnace at superheater elevation.





Higher Heat Releases Permitted

The fuel is burned within the Turbo Furnace bottom, just above the Turbo Furnace floor . . . the entire furnace wall area is available for heat recovery. The nominal heat release may thus be higher than for horizontally fired boilers.

Lower External Structure Cost

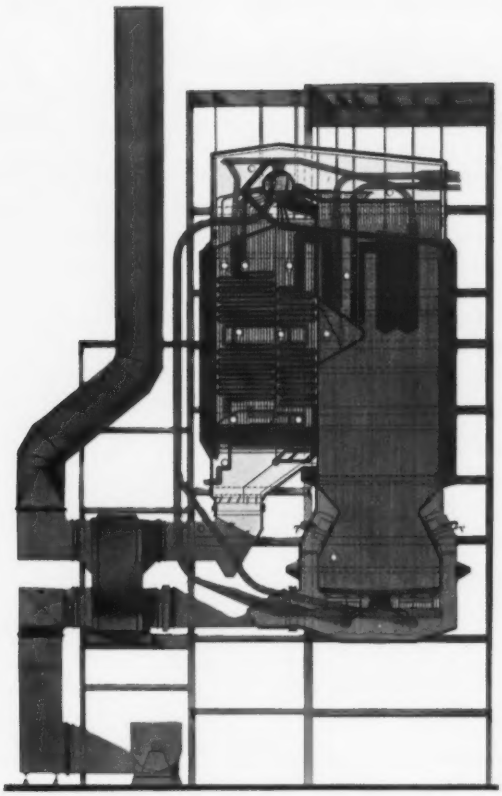
With lower furnace heat releases permitted the Riley Turbo Furnace boiler occupies less cubical space. One burner level eliminates platform and ladder construction costs.

Wider Single Furnace Boiler Units Permitted

Furnace design, combined with the opposed method of firing, controls gas flow pattern to remove limitations on furnace widths inherent with other methods of firing. Gas temperature traverses at the furnace exit are extremely uniform.

Minimum Metal Temperature Variations Due To Uniform Gas Flow

The view at left and chart are of the 55 foot wide single furnace of the 1,550,000 lb/hr unit above. Furnace has no division walls or platens. The chart shows the uniform metal temperature gradient of superheater and reheater tubes spaced across the width of the furnace. The maximum variation above the normal 1005 F is well within safe limits assuring long metal life. The chart also shows the same uniform pattern for lower loads.

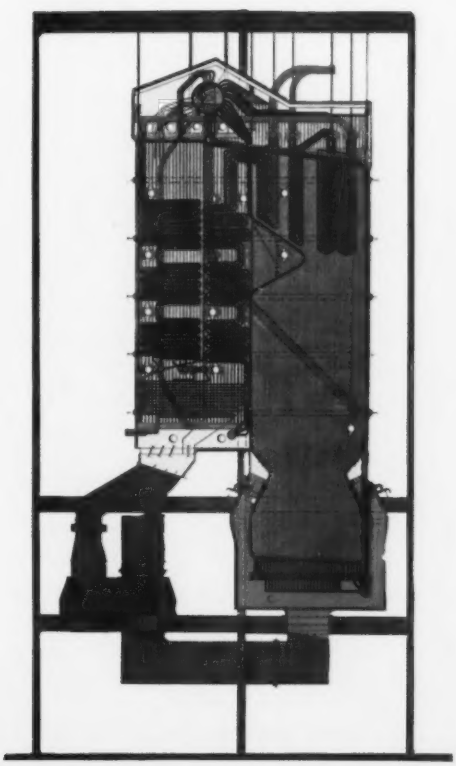


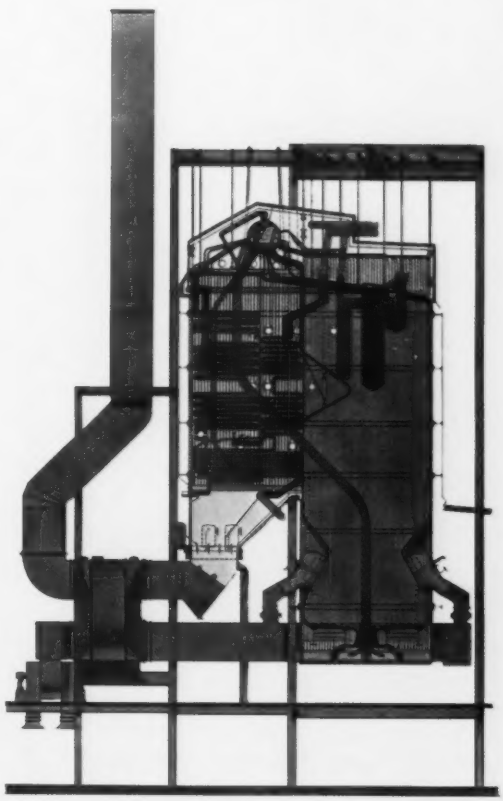
TYPICAL RILEY TURBO FURNACE BOILER INSTALLATIONS

At left — North Lake Steam Electric Station, Dallas Power & Light Company. 1,200,000 lbs/hr — 2125 psig, 1005/1005 F with pressurized Turbo Furnace. Fired by natural gas and oil.

Lower left — Turner Unit No. 4, Florida Power Corporation. 600,000 lbs/hr—1650 psig, 1000/1000 F. Fired by oil and natural gas.

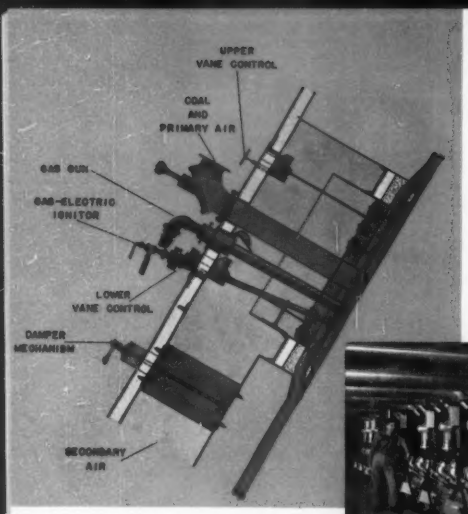
Below — Permian Basin Steam Electric Station, Texas Electric Service Company, 825,000 lbs/hr, 1750 psig, 1005/1005 F. pressurized. Fired by natural gas, oil, (Future pulverized coal).

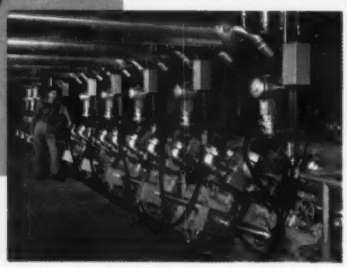




RILEY

STEAM GENERATING & FUEL BURNING EQUIPMENT

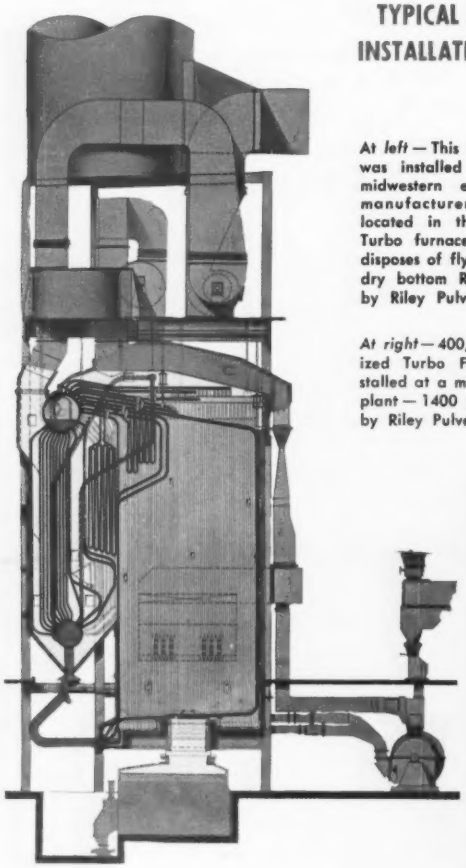




Turbo Furnace Burner Maintains Stable Flames Over Wide Load Ranges.

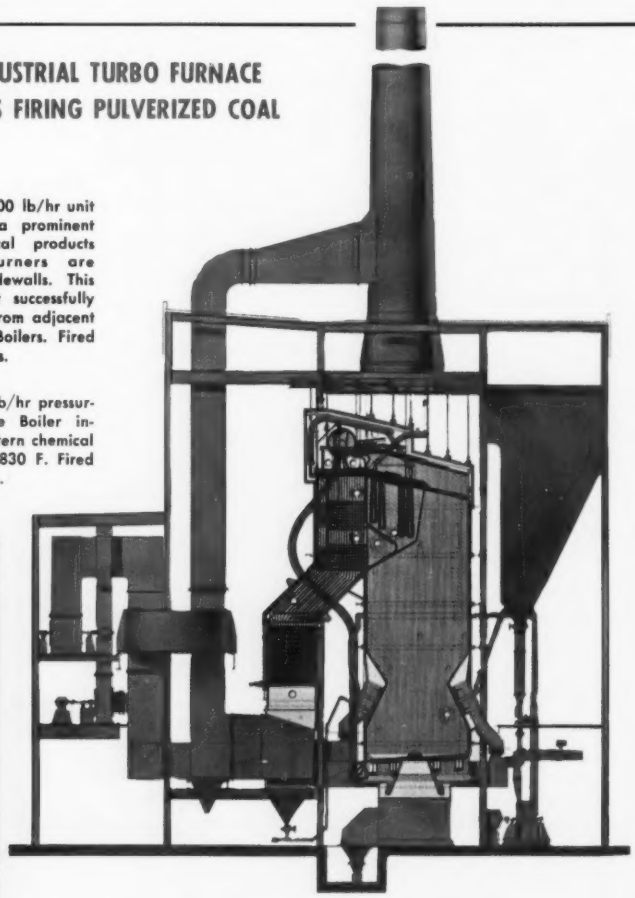
Riley Directional Flame Burners are designed expressly for the Turbo Furnace to burn gas and oil and pulverized fuels that are burned in suspension such as coal, lignite, fluid coke, delayed coke, etc. Burners are arranged for opposed firing on one level. Fuel and combustion air are introduced thru openings between furnace wall tubes. There is no exposed refractory to maintain. Directional vanes control placement of flame. Turn down ratio for gas is limited by gas flow control system; minimum load for oil is limited only by oil atomization (7 to 1 ratios have been attained). Stable flames with coal firing are easily maintained on a 5 to 1 load ratio.

TYPICAL INDUSTRIAL TURBO FURNACE INSTALLATIONS FIRING PULVERIZED COAL



At *left* — This 150,000 lb/hr unit was installed by a prominent midwestern electrical products manufacturer. Burners are located in the sidewalls. This Turbo furnace Unit successfully disposes of flyash from adjacent dry bottom Riley Boilers. Fired by Riley Pulverizers.

At right — 400,000 lb/hr pressurized Turbo Furnace Boiler installed at a midwestern chemical plant — 1400 psig, 830 F. Fired by Riley Pulverizers.



Ask your Riley representative for detailed information about Riley Turbo Furnace Boilers — or write direct to RILEY STOKER CORPORATION, WORCESTER, MASSACHUSETTS.

RILEY

STEAM GENERATING & FUEL BURNING EQUIPMENT

SALES OFFICES

Boston, Charlotte, Chicago, Cincinnati, Cleveland, Detroit, Houston, Jacksonville, Kansas City, Los Angeles, New Orleans, New York, Philadelphia, Pittsburgh, Portland, Salt Lake City, San Francisco, Seattle, St. Louis, St. Paul, Syracuse.

The Electrical Week

LATE NEWS ▶ **Washington Wire** . . . Recreational benefits could account for up to 10% of multi-purpose project cost in section added to Rivers and Harbors Bill . . . House passes legislation to lower interest rate (from 4.125% to 2.625) for future dams in Upper Colorado project.

Atom Items . . . Cost saving of about 40% per inch of charge is claimed by Electric Autolite for experimental extruded ceramic nuclear fuel elements developed in conjunction with Allis-Chalmers Nuclear Div . . . Thermionic and thermoelectric generators in tandem have produced electricity directly from nuclear heat in Westinghouse's testing reactor. The new concept, according to VP John Simpson, will enable energy to be extracted at about 3,700F inside the fuel element, followed by additional conversion in a conventional steam cycle at about 600F. Combination holds promise of substantial gains in A-plant efficiency.

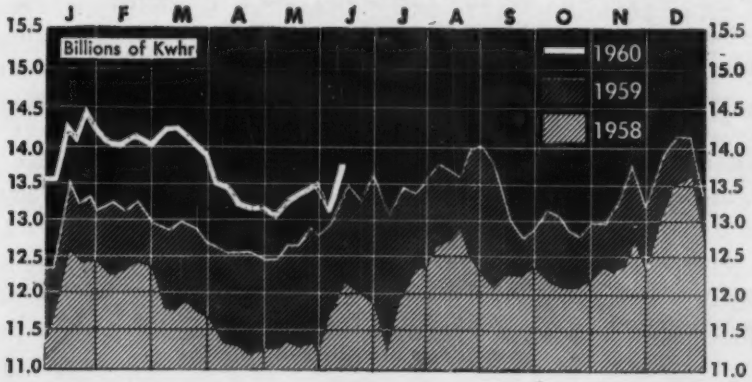
Price reduction of 4% for power transformers 2,000 through 7,500 kva is announced by GE. A 5% reduction went into effect in May.

A total of 50 "not guilty" and five "guilty" pleas are entered by electrical manufacturers and individuals charged in second round of antitrust arraignments. Trials will be in September.

"Mature judgment is needed to end a senseless price war," says E. A. Williams, president of Memco Engineering. He said recent prices for power switching equipment had been below his costs and presumably below the cost of his competitors. He charged that competitors are either panic stricken by the Philadelphia Grand Jury, or are attempting to bankrupt smaller manufacturers.

Management Changes . . . Reid Gardner named chairman of Southern Nevada Power Co; remains president and general manager.

WEEKLY POWER OUTPUT—UP 1.9% (Week ending June 11), Kwhr 13,766,000,000



Per Cent Change From Previous Year

	May 28	June 4	June 11
Total U. S.	+ 6.2	+ 0.9	+ 1.9
New Eng.	+ 8.0	− 1.8	− 0.1
Mid. Atlan.	+ 4.5	− 2.0	− 1.7
Cent. Ind.	+ 3.3	− 4.0	− 3.0
West Cent.	+ 7.8	+ 0.4	− 0.8
Southeast	+ 5.9	+ 3.6	+ 3.6
South Cent.	+ 4.5	+ 7.0	+10.8
Rocky Mount.	+10.5	+ 7.2	+ 7.9
Pacific			
NW	+18.6	+ 4.2	+ 3.6
SW	+ 8.8	+ 5.7	+ 8.9

Seasonally Adjusted Index 269.2
Week Ago 266.3 Year Ago 254.7

Source: Edison Electric Institute

Preview of This Issue

EVENTS **AEC licensing policy loses** important court decision in Enrico Fermi case (p 82) . . . Supreme Court denies US liability in Oklahoma water rights suit (p 83) . . . Dan Braymer's second report from Europe (p 84) . . . Clyde Ellis and Robert Person tangle over EEI policy suggestions to Democratic Advisory Council on Natural Resources at hearing in Denver (p 85) . . . Full text of EEI natural resources policy is carried for use by nation's utility companies (p 86).

MEETING REPORT ▸ 28TH ANNUAL EEI CONVENTION **Although the US leads the world in electric power development,** and will continue to do so, there will be many problems for the investor-owned electric companies to face and solve if they are to continue to meet the demands which the future will place upon them. This was the principal subject of speakers and conferees at EEI's 28th annual meeting, held in Atlantic City, N. J., June 6-8. Other areas —system planning and power pooling, safety, research, engineering, finance, etc—were also given much attention. Sherman Knapp, president of Connecticut L&P, was elected 1960-61 EEI president. EW's 12-page report begins on **page 93.**

ENGINEERING ▸ **Five conductors for Penelec's 460-kv line will be tested** this summer. The expanded ACSR conductors will be tested for suitability

Politics and Public Power

'TO BUILD BOTH LOAD AND CHARACTER . . .'

In the interview which appears on pages 102-103, Sherman R. Knapp of Connecticut Light & Power Co, the new president of Edison Electric Institute, lists urban redevelopment and renewal as one of the three important areas in which utilities must become more active.

Knapp was not merely paying lip service to the idea. On the local level, he has already put CL&P right in the middle of urban redevelopment activities going on in its service area; nationally, he is a director of ACTION—the American Committee To Improve Our Neighborhoods. And, in a speech before the Pacific Coast Electrical Assn in Las Vegas last month, Knapp singled out urban redevelopment as "an area of activity that can do much to enhance our reputation as responsible citizens."

He called on the PCEA'ers—especially the utility men—to support ACTION: "All I can say, after some company and personal experience involving ACTION, is that any utility which doesn't fall in, and join in, to support (it) is neglecting a great opportunity to build both character and load."

Utilities are uniquely qualified to help in urban redevelopment, Knapp maintains, because they are so closely integrated into the life of the communities they serve. "As public utility operators, you know better than anybody, except the police, fire department and social workers, what is happening in our cities." Decrying the downgrading of entire neighborhoods, the CL&P executive painted a profile of the typical slum:

- It occupies **one-fifth** the city's area;
- It contains **one-third** its people;
- It has **one-third** of the fires;

and economics. Four are paper expanded; the fifth has aluminum expansion tubes **(p 88)** . . . General Public Utilities is carrying out economic system loading with an automatic dispatch system **(p 91).**

PROCUREMENT & PRODUCTS ▶ **Prices of some indoor distribution equipment has been raised 10%** . . . Pennsylvania P&L Pres C. E. Oakes pleas for utility-manufacturer cooperation in smoothing out buying cycle **(p 159)** . . . **I-T-E** says the size of isolated phase bus can be reduced by cooling it, using liquids **(p 160)** . . . Line tap switch is designed for transmission lines . . . Cutout-arrestor for rural distribution lines is single-bracket mounted **(p 167).**

BUSINESS OUTLOOK ▶ **How's business? Good, mixed, or bad? It depends on your viewpoint.** Strong sales and warm weather have lifted much of the uncertainty of earlier months, but industrial production continues to slide, and businessmen have scaled down their capital spending plans **(p 177).**

SELLING ▶ **Connecticut L&P and Detroit Ed win Reader's Digest awards** for street lighting. The details on **page 182.**

NEXT WEEK ▶ **Be sure to read EW's third 1960 Electric Utility Methods Report.**

- It accounts for **one-half** the crime;
- It breeds **one-half** the diseases; and
- It consumes **one-half** the tax revenues

while contributing only **one-twelfth** of them.

There is no benefit to anyone or anything from these "cancers of our cities," according to Knapp. Certainly, the utility is the loser . . . in more ways than one. "The billing department can see its spread in dwindling revenues, the repair department knows its cost in trouble calls and vandalism, and the commercial department knows what happens when business moves out and stores go vacant."

All this adds up to a definite civic responsibility for the utility in Knapp's view. He has asked the question on a number of occasions —and it still remains to be answered—Why haven't electric utilities been more active in urban redevelopment activities? "Urban renewal and redevelopment is a natural for them. I don't understand why many of them fail to show any interest in it . . . in a national program like ACTION."

The EEI president points out that "ACTION, with all modesty, says that it cannot get very far in a community program unless the utilities are part of it."

In addition to the local community relations and load benefits accruing to the utility participating in ACTION, Knapp sees what he regards as an equally important industry-wide one.

His reasoning runs like this: ACTION is a national program. If the investor-owned electric utilities can be persuaded to take part in and identify themselves with it on a truly nation-wide, industry-wide basis, then it may be helpful in closing the "image gap" between the highly favorable local one of a particular company and the national one of, as he puts it, "something less than handsome and heroic."

Executive Reader

REA strongly urges each of its borrowers to develop and maintain a comprehensive, long-range financial plan and forecast. The financial plan and forecast should cover at least ten years, including projections of annual revenues, costs and margins, as well as projections of "balance sheet" data to determine what will be owed, and what will be the net worth of the business. As approved by management, the financial forecast, periodically revised, should provide for the achievement of carefully determined objectives and policies of the business and should serve as a basis for future objectives. To further these suggestions, REA has prepared a 32-page bulletin which presents a step-by-step procedure for making long-range financial forecasts. **How to Make and Use Financial Forecasts, Bulletin 105-5, Rural Electrification Administration, U. S. Dept of Agriculture, Washington 25, D. C.**

The electric power system of a group of people shipwrecked on a Pacific island is the subject of a 14-min movie titled "The Castaways." Produced in Hollywood for Cleveland Electric Illuminating Co, the movie tells of an electric power system part public power and part private power and how this leads to trouble. Although the subject is treated with humor, there is "a built-in unconditionally guaranteed moral" in the plot. **The Motor, June 1960, Cleveland Electric Illuminating Co, Cleveland, Ohio.**

The whole field of the collection and dissemination of statistics and market information, the study of trends and overseas competition, and the interchange on such matters as cost comparisons, prices and discount structures may well form a primary responsibility of trade associations in the future. This is a service which can be secured only through an association enjoying a wide measure of support and trust. With this backing, an association can do much to stimulate enterprise and efficiency and encourage sensible trading policies. **Co-operation in the Electrical Industry, Stanley F. Steward, British Electrical & Allied Manufacturers' Assn, Electrical Review, May 27, 1960.**

High-use customers are considerably more critical of service and rates than customers in the lower-use brackets. A research study of customer opinion revealed that the likelihood of a resultant "special handling" case grows with great rapidity toward the higher end of the bill brackets. We can look forward to the prospect of more and more customers giving us a vastly increased number of "high-bill headaches" unless preventative measures are taken. **The Latest in Customer Relations, C. T. Schoch, EEI Bulletin, May, 1960.**

All done by sun-down

New O-B pothead saves enough time to get oil-filled cable under permanent seal in a working day

It might sound like splitting hairs to talk a few hours' time saving on a job as expensive as building a high voltage pothead. Yet, it's a fact, these few hours are very valuable!

Modern O-B capacitor-graded potheads have many components that are factory assembled - - many more that are considerably simplified. The construction crew can leave the job at quitting time with an O-B pothead completed.

This means that the oil-filled cable need not be under temporary seal over night. Risk of exposure is cut materially. Ask your cable man what it means to clean up a pothead in a day's time, and have it under permanent seal by sun-down. Here is where the time saving of O-B potheads really pays off.

This is just one of many features of O-B's new terminal equipment. It will pay you to know the whole story before you plan any new construction. You can get it from your O-B representative or by writing us direct.

OHIO BRASS COMPANY, MANSFIELD, OHIO

Ohio Brass (B) HOLAN

PORCELAIN INSULATORS • LINE HARDWARE • CAPACITORS • LIGHTNING ARRESTERS
BUSHINGS • HOLAN TRUCK-MOUNTED POWER DEVICES AND BODIES • BRONZE VALVES

100007-H

EXCLUSIVE WEATHER LIFEGUARD™ ARC TUBES

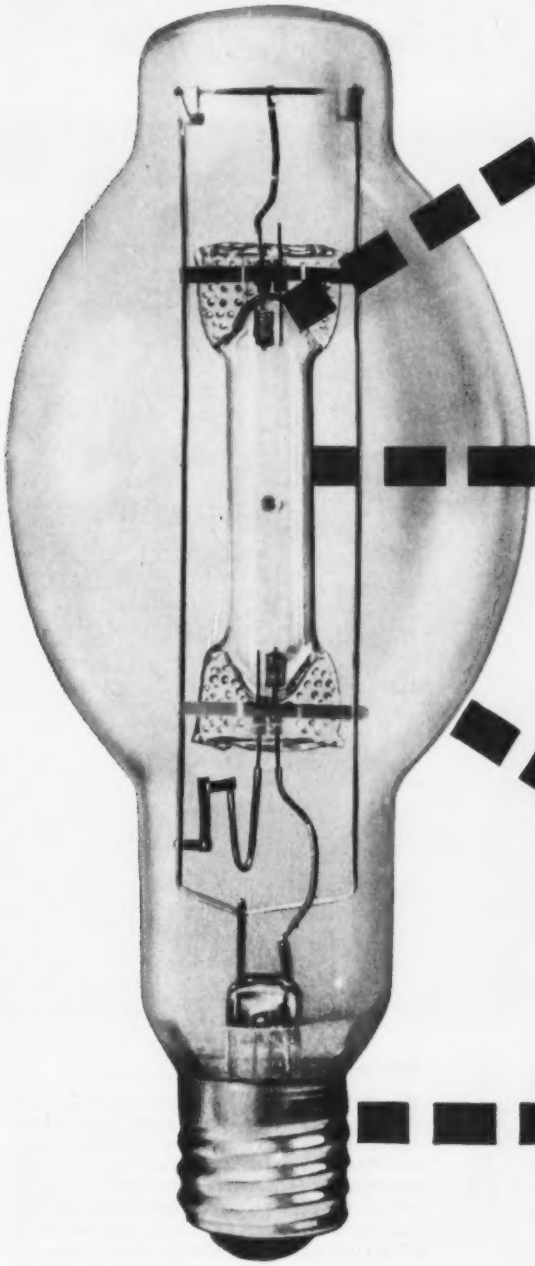
YOUR BEST BUY

IN MERCURY LAMPS!

By any standard of comparison, new Westinghouse "Lifeguard" mercury lamps are the most economical choice for industrial, street, and parking lot lighting. The exclusive Westinghouse "Lifeguard" arc tubes in these lamps save you money by maintaining high initial light output longer. And, they make possible lower-cost new lighting installations.

In addition to getting more light per dollar, you save on labor and maintenance costs, too, with less frequent lamp changing. And "Lifeguard" lamps are made with famous Westinghouse "Weather Duty" bulb construction for resistance to thermal shock, moisture and all industrial fumes. New Westinghouse "Weather Duty" lamps with "Lifeguard" arc tubes are interchangeable with other types of the same wattage. Make the change today. Contact your authorized Westinghouse lamp agent or nearest Westinghouse sales office.

DUTY™ LAMPS WITH MAKE WESTINGHOUSE



New design electrodes with specially-compounded and locked-in emission material virtually eliminate light-robbing arc tube blackening.

"Lifeguard" arc tube improves lumen maintenance . . . 85 percent of initial light output after 10,000 hours.

First with "Weather Duty" lamps . . . fume-proof and moisture-proof, shock-resistant glass.

Permanent-grip silicone cement holds bases tight for the life of the lamp. Remains strong at high temperatures. No strain on glass.

YOU CAN BE SURE . . . IF IT'S Westinghouse

Westinghouse Lamp Division • Bloomfield, N. J.

MOLONEY DISTRIBUTION TRANSFORMERS ARE DESIGNED TO MEET ALL SYSTEM REQUIREMENTS

Comparative analysis of distribution transformers invariably leads to one conclusion . . . the best distribution transformer has all characteristics of design carefully developed in respect to their contribution to system efficiency, dependability and economy.

In Moloney Distribution Transformers, no one feature, electrical or mechanical, is radically improved at the expense of another. Instead, each part of the design is carefully considered and balanced with the others, to provide a distribution transformer that will give the best all-around system performance.

Utility systems benefit from this philosophy of design because every Moloney Distribution Transformer feature is designed to perform in the best possible manner compatible with every other aspect of the design, and thus provide "More Power To You."

Desirable Features of Moloney Distribution Transformers Include . . .

High Short Circuit Strength
Mechanical Strength
Weatherproof
Corrosion Resistant
AL-CU Connectors
No Radio Interference

Here Is How They Are Achieved.

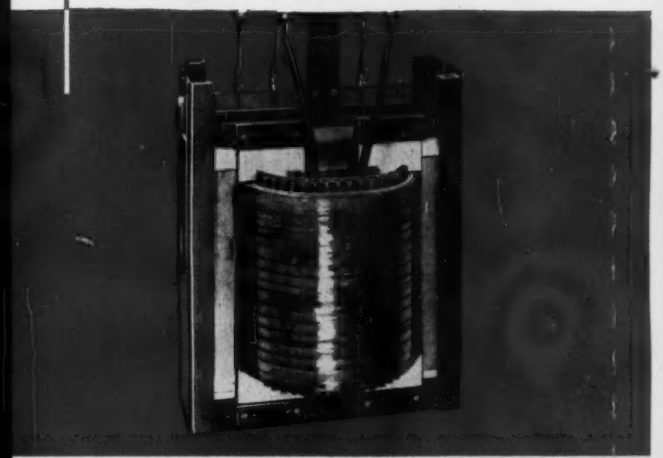
SUPERIOR PERFORMANCE BECAUSE...

MOLONEY ELECTRIC CO.

Since 1896 ... ***MORE POWER TO YOU***

1 High Short Circuit Strength

All turns are anchored into position and resin-coated layer insulation is used throughout the coil. During the coil drying process this resin bonds the adjacent paper and wire together but does not keep the oil from penetrating all insulation. Steel frames secure wood blocks which press against the stayback on both top and bottom of the coil to hold it rigidly in position.



4 Corrosion Resistant

All materials used for Moloney tanks and accessories are especially selected for their resistance to corrosion and the tank, cover and base are painted with a tough, flexible weather resistant paint. The tank and cover are of heavy gauge metal and all connectors, clamps and other hardware are made of alloys which are relatively impervious to weather. All bushing mounting hardware is located internally, thus removing several possible sources of corrosion.

SALES OFFICES IN ALL

2

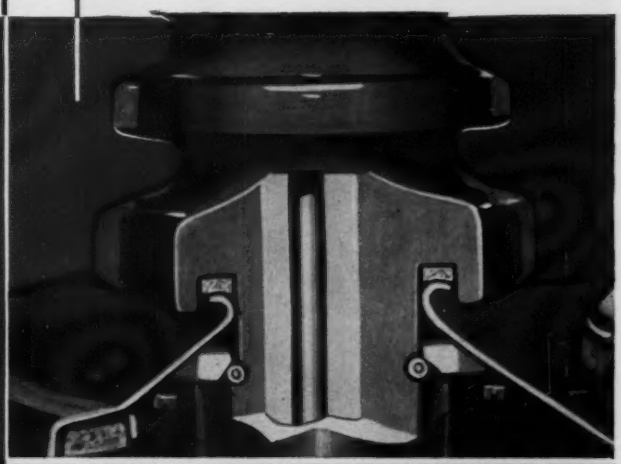
AL-CU Connectors

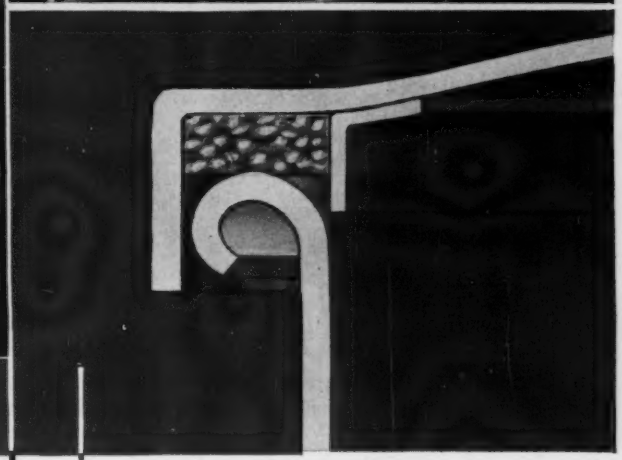
The solderless connectors are electro-tin coated and are designed to accommodate either the copper conductors specified by EEI-NEMA Standards or the ACSR equivalent. The large contact surface reduces conductor cold flow and the double-coil, spring-type washer compensates for any cold flow which may occur. Connectors are made of silicon bronze alloy to prevent twisting or breaking.

3

No Radio Interference

On voltages up to 15 KV the high voltage bushing boss is rolled to prevent the formation of corona at the point where the bushing passes through the cover. At higher voltages a conductive glaze and mounting adapter is combined with the rolled boss to prevent corona. These practices render Moloney Transformers free from potential sources of radio interference.





5

Mechanical Strength

The tank, cover, bushings and other components are designed to resist damage in shipment, handling or installation.

The metal used in the tank and cover is heavy gauge, copper bearing steel formed to give added strength at the points most susceptible to damage, especially at the tank base flange, where there is a triple thickness of metal.

All bushing corrugations have a thick vertical cross section to give the bushing high impact strength.

6

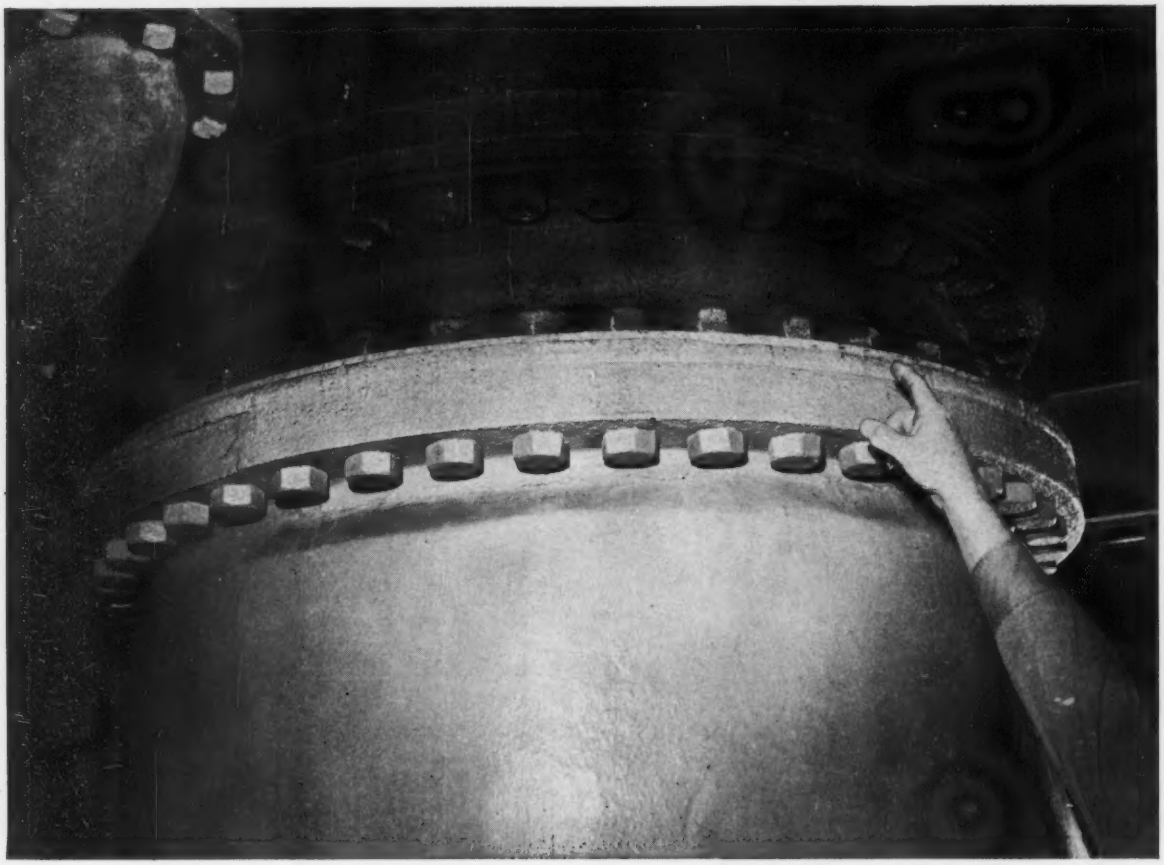
Weatherproof

To assure that the transformer is sealed from the atmosphere and the elements, bushing openings have retained corprene gaskets; cover bushings are mounted on rolled bosses whose flanges curve up and away from the opening; a corprene cover gasket seats on the rolled top rim of the tank and is retained by the rim, cover overhang, and an internal gasket retainer. The cover gasket remains in the cover when cover is removed from the tank and therefore will not stretch out of shape necessitating replacement.

MEGO-8

PRINCIPAL CITIES • FACTORIES AT ST. LOUIS 20, MO., AND TORONTO, ONT., CANADA

US RUBBER EXPANSION JOINTS



INSIDE STORY THAT'S PLENTY SALTY

The Jersey Central Power & Light Co. (Werner Station), South Amboy, N.J., has a condenser which handles 475,000 lbs. of steam per hour. Sea water is pumped into it at 35,000 gallons a minute.

Two U.S. Rubber Expansion Joints are used in this operation: One on the inlet and the other on the discharge end. They not only resist the salty sea water, but they rise and fall with the condenser. This condenser must be permitted to rise and fall according to the steam load. Only a U.S. Rubber Expansion Joint would function this way—a brittle or stationary joint would not.

These joints have been performing without let-up since 1953, six trouble-free years in teamwork with the condenser. Many more trouble-free years are expected from these "U.S." Joints.

• • •

When you think of rubber, think of your "U.S." Distributor. He's your best on-the-spot source of technical aid, quick delivery and quality industrial rubber products.

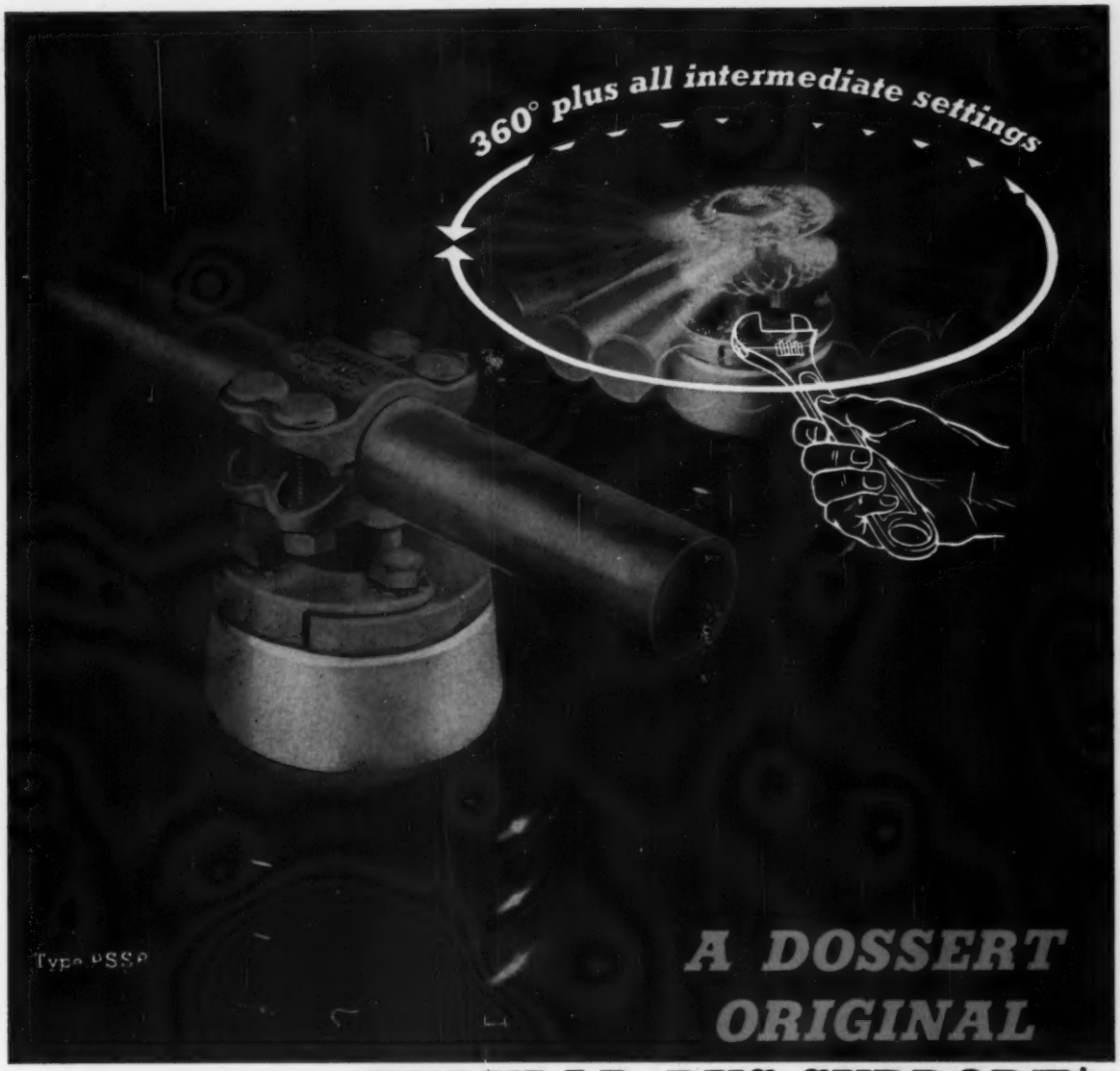
US RUBBER

Mechanical Goods Division

United States Rubber

WORLD'S LARGEST MANUFACTURER OF INDUSTRIAL RUBBER PRODUCTS

Rockefeller Center, New York 20, N.Y. In Canada: Dominion Rubber Company, Ltd.



fully adjustable, TUBULAR BUS SUPPORT*

This bus support, made of high-strength bronze throughout, has the following outstanding features:

- Fully adjustable to any angle whatsoever within a complete circle (360°).
- No need to lift bus out of support to change angular position.
- To change position within seconds, merely loosen 4 insulator mounting bolts, rotate assembly to desired angle and re-tighten bolts.
- No inaccessible internal bolt employed for angular setting.
- The only bus support whose angular adjustment does not jeopardize its overall strength.
- By reversing cap bus can be tight-mounted or slip-mounted.

Write for illustrated brochure!

***U. S. PAT. 2,861,762**

50 YEARS OF LEADERSHIP IN METAL FABRICATION

DOSSERT MFG. CORP.

249 Huron Street, Brooklyn, New York

Representatives in principal cities.

Distributed outside the U.S.A. and Canada by

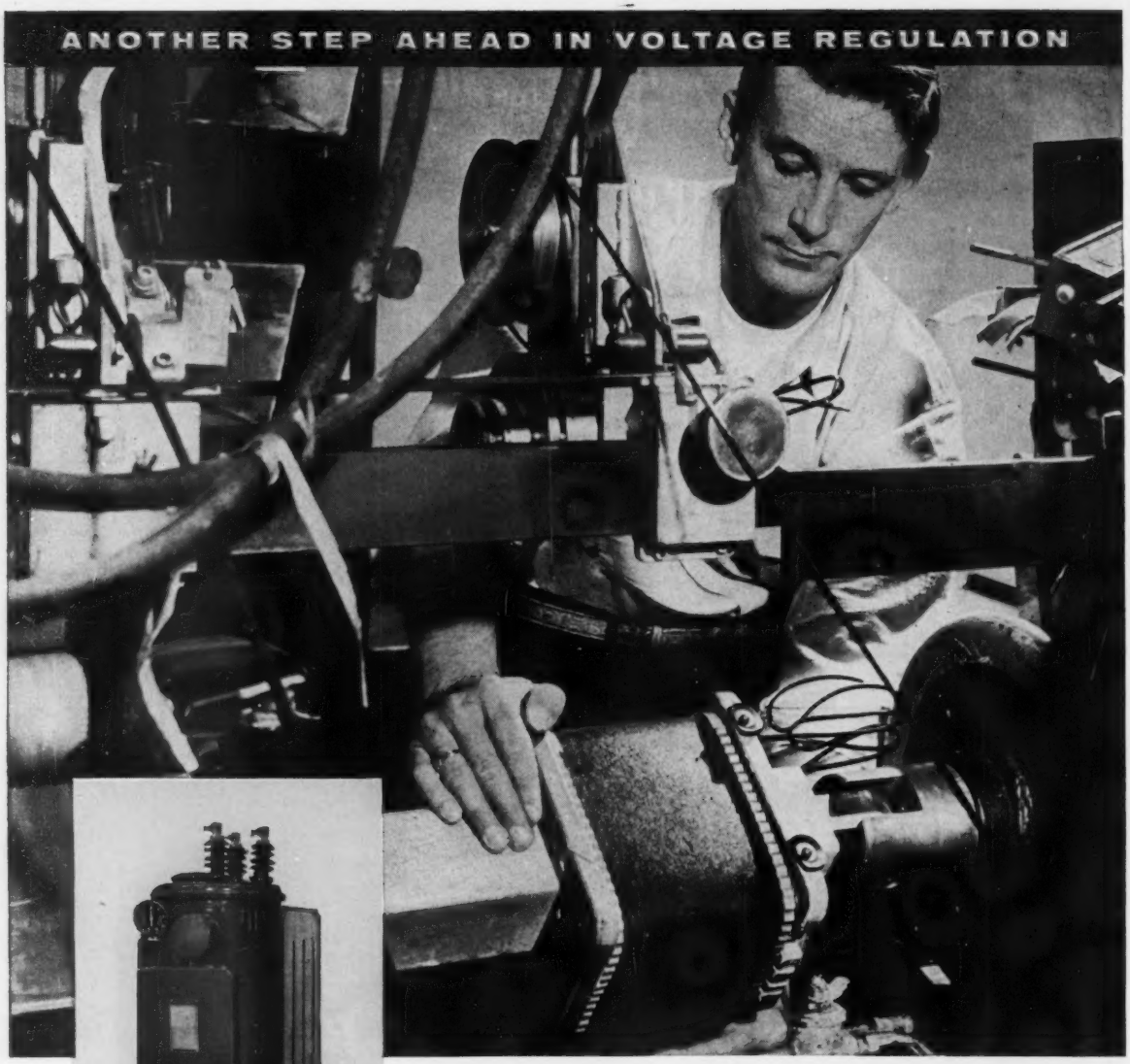
INTERNATIONAL GENERAL ELECTRIC COMPANY

Construction Materials and Lighting Sales

150 East 42nd Street

New York 17, N.Y., U.S.A.

ANOTHER STEP AHEAD IN VOLTAGE REGULATION



NEW Permalex Insulation

Permalex* coil insulation in General Electric voltage regulators boosts reliability—lengthens regulator life

New Permalex insulation—another regulator first from General Electric—is now standard on all G-E ML-32 single-phase, step voltage regulators. Permalex makes possible added regulator economies through longer core and coil life and greater reliability—at no price premium.

Permalex insulation preserves high dielectric strength because of the special cyanoethylation of its kraft insulation paper. This process, exclusive with General Electric, retards formation of moisture released by cellulose materials under load—slows aging process of insulation to give you longer regulator life. Permalex insulation is fully compatible with other regulator components and provides a true *system* approach to regulator design.

Another outstanding G-E regulator feature which increases quality, Permalex insulation gives you more regulator for your money. It is, in fact, another reason why *G-E regulators cost less on the line.*

Ask your General Electric regulator representative for more information about Permalex-insulated ML-32 regulators—as well as the entire line of G-E voltage regulators. Or, write to Section 456-03, General Electric Company, Schenectady 5, N. Y.

*Trade-mark of General Electric Company

Progress Is Our Most Important Product

GENERAL ELECTRIC

INDIAN POINT

Indian Point Station as it looked in April this year, showing some of the piping to be installed by Kellogg's Power Piping Division

NUCLEAR POWER PIPING BY KELLOGG

Construction progress at Consolidated Edison Company's Indian Point Station demonstrates how Kellogg's broad erection experience can take tomorrow's newest and toughest power piping requirements in stride.

At this unique 275 Mw nuclear steam electric generating station, Kellogg has a contract to manufacture, deliver, and to erect all stainless and carbon steel nuclear piping for the inside of the reactor sphere, and all power piping for the conventional portion of this plant. Kellogg also stress-analyzed the major portion of this piping. Much of the stainless piping will be manufactured in Kellogg's Williamsport plant.

The particularly rigid specifications of high quality and close tolerances required the assignment of a special engineering staff to the site. This staff plans, coordinates and supervises each step of Kellogg's erection assignment. One important phase entails over 2200 critical welds, most utilizing Kellogg's K-Weld technique. Another is the radiographic inspection of each weld, which Kellogg is undertaking with its own equipment and personnel.

Kellogg welcomes inquiries for its stress analysis, metallurgical, engineering, manufacturing and erection services.

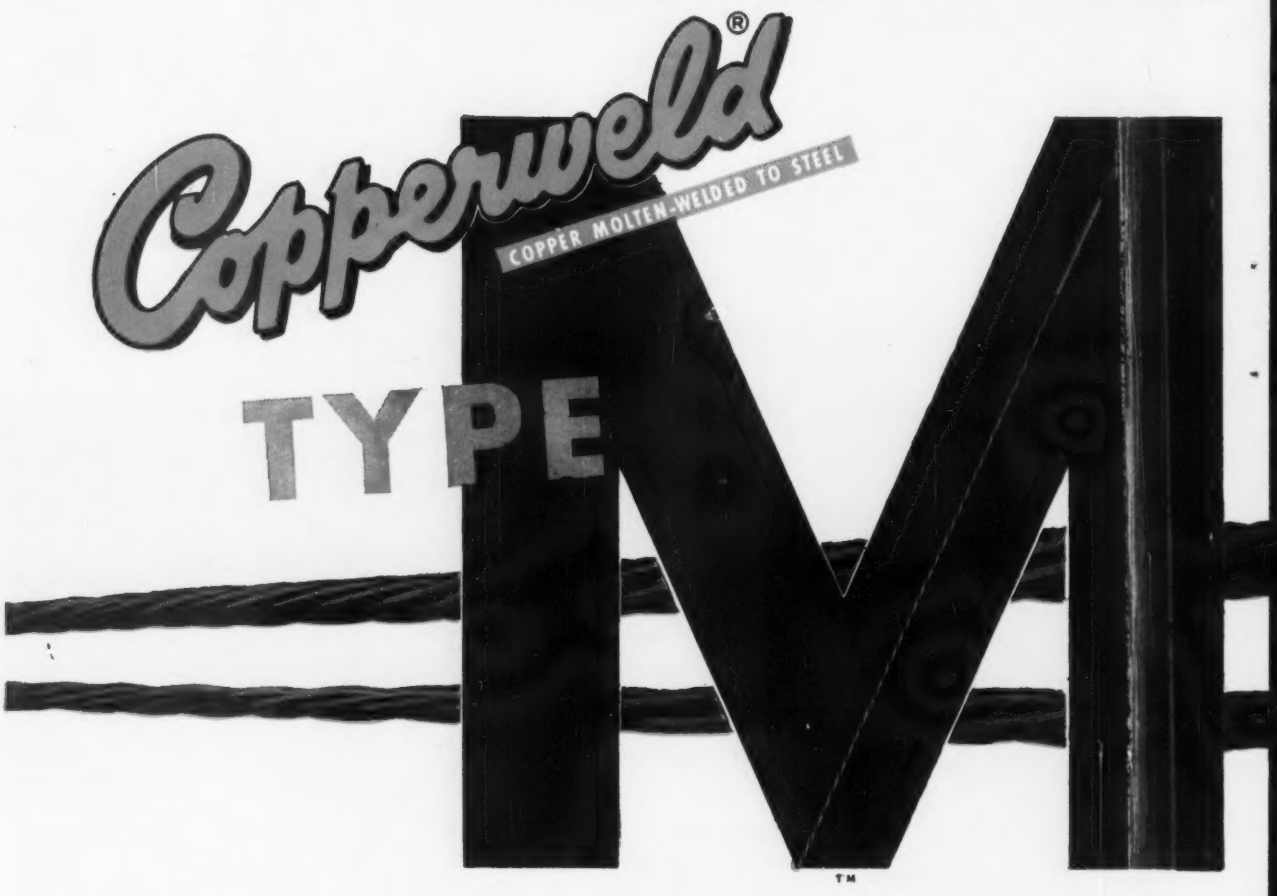
KELLOGG

POWER PIPING DIVISION • THE M. W. KELLOGG COMPANY

711 THIRD AVENUE, NEW YORK 17, N. Y. • A SUBSIDIARY OF PULLMAN INCORPORATED

Offices of Kellogg subsidiary companies are in Toronto, London, Paris, Rio de Janeiro, Caracas, Buenos Aires.

TODAY'S BEST BUY



Install Copperweld Type M Guy Strand on your lines. It's a low-cost, money-saving way to rid yourself, once and for all, of the trouble and expense that result when guys weaken or fail because they haven't got what it takes to resist corrosion.

Copperweld Type M Strand resists corrosion. Each wire is permanently protected against rust by a thick copper sheath that is inseparably molten-welded to a high-strength alloy steel core. And because it's molten-welded, the copper will not crack, flake or peel from the steel core.

As a result you pay for only one guy installation. You can put up Type M Guy Strand and forget it because its original strength is permanently maintained. In fact, this non-rusting guy strand will match the long life of modern poles.

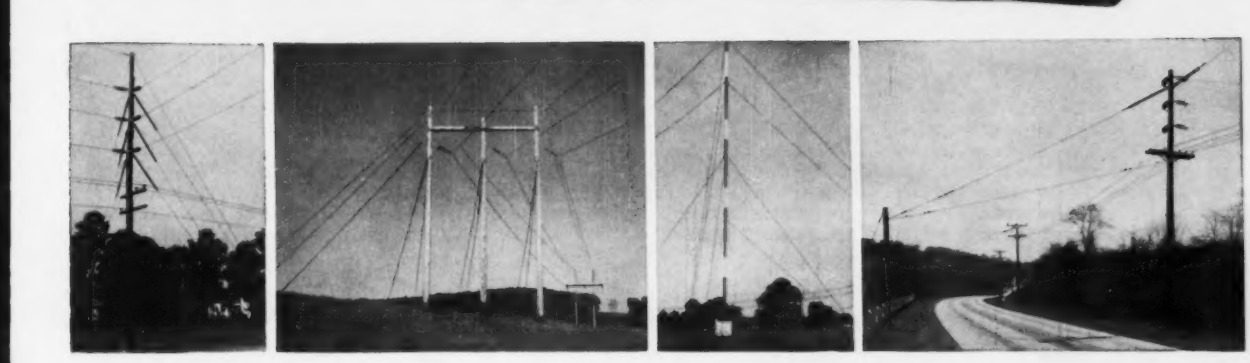
Moreover, Type M Strand goes up fast because it is easy to handle. It can be readily dead-ended by any of the conventional methods. Our Engineering Data Bulletin E.D. 1878 gives you the complete story. Send for it today.

PROVED DEPENDABILITY AND LONG LIFE. .

FOR ALL GUYING PURPOSES . . .

GUY STRAND

requires no maintenance . . . matches pole life

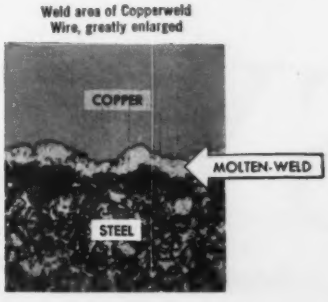


WHATEVER YOU GUY . . . GUY WITH COPPERWELD TYPE M STRAND

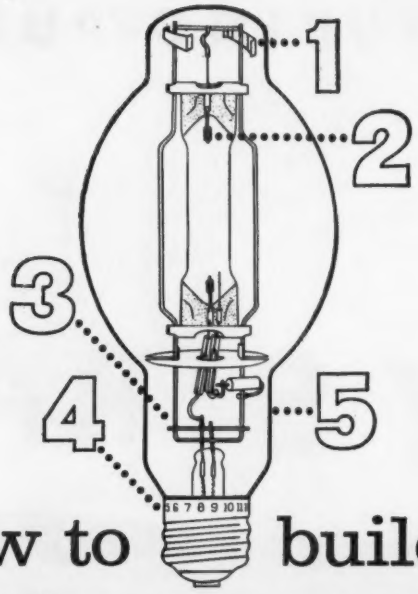
Easily installed, Copperweld Type M Strand provides low-cost, safe and permanent guying for overhead lines, towers, poles, antennas, stacks, and similar structures. Put this non-rusting strand up and prove it for yourself.

COPPERWELD STEEL COMPANY
WIRE AND CABLE DIVISION *Glassport, Pa.*
For Export: COPPERWELD STEEL INTERNATIONAL COMPANY, New York

Weld area of Copperweld Wire, greatly enlarged



. . . . . *assured by the* **MOLTEN-WELD**
-exclusive with Copperweld

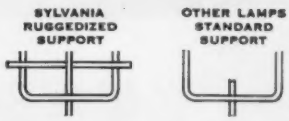


How to build the world's best mercury lamp

5 bright ideas that make Sylvania Mercury Lamps outstanding...and a 6th that guarantees it!

1 Built-in "Shock Absorbers." Top-down view of Sylvania Ruggedized Dome Support shows tough double-leaf springs. They absorb shocks, vibrations, maintain correct position of arc tube. Even under roughest wear, Sylvania Mercury Lamps keep burning bright.

2 Brighter, faster lighting . . . even at 20°F. below! New Sylvania Trimetallic Electrode construction gives maximum protection, best performance, more light, longer life than any other mercury lamp! Sylvania Lamps start even in dead of winter!



3 Welded twice-over strongly . . . *that's* support! Other lamps balance the arc tube on a single welding. If it breaks, good-bye, lamp! Sylvania Ruggedized Base Support has *two* weldings. Result: *more* strength against shocks, vibrations. Longer life with Sylvania!

4 Bookkeeping done right on the base! Time-saving, moneysaving idea here! Sylvania Light Recording Base lets you scratch numbers on base representing month, year of installation. With 12,000-hour average rated life, Lamp itself tells how long it's lasted!

5 "Weather-conditioned" glass shell. Let it rain, sleet, snow or suddenly turn blistering hot, Sylvania Ruggedized glass shell stands up to all weather, resists thermal shock. No worries any time of the year with Sylvania Mercury Lamp. We repeat: this lamp *lasts!*

6 Exclusive Sylvania "Light Insurance Policy"—*This* is your guarantee of best performance, lowest TCL – Total Cost of Lighting (which means cost of lamp plus power plus maintenance). See your Sylvania representative. Or write to us for information.

Sylvania Lighting Products, a Division of Sylvania Electric Products Inc., Dept. 64, 60 Boston St., Salem, Mass. In Canada: Sylvania Electric (Canada) Ltd., P.O. Box 2190, Station "O," Montreal 9.

SYLVANIA

Subsidiary of **GENERAL TELEPHONE & ELECTRONICS**

The American Brass Company
Waterbury 20, Conn.

Please send me a copy of your 8-page booklet which details properties of your four free-cutting, high-conductivity coppers, and suggested machining practices.

Name.....

Company.....

Street.....

City.....**Zone**.....**State**.....

4 ways to cut the cost of high-conductivity parts

There are now four free-cutting, high-conductivity Anaconda coppers that broaden the combinations of mechanical, physical, and fabricating properties available for boosting production and cutting costs of high-conductivity parts. They are furnished chiefly in rod and bar, but are available also as extruded shapes and, except for the leaded coppers, die-pressed forgings of simple design. All have good cold-working properties.

Leaded Copper-126 and Deoxidized Leaded Copper-129 have slightly higher electrical conductivity—98% IACS annealed, 95% IACS, minimum. The difference between them is that Alloy 129, being deoxidized, is not subject to hydrogen embrittlement when annealed or furnace-brazed in reducing atmospheres. Neither leaded alloy is recommended for hot working.

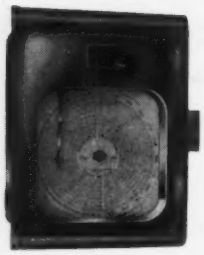
Tellurium Copper-127 and OFHC Sulfur Copper have an electrical conductivity rating of 95% IACS annealed, 90% minimum. Both may be extensively hot worked and neither is subject to hydrogen embrittlement. Tellurium Copper-127 has the advantage of retaining its mechanical properties at temperatures higher than those tolerated by the other free-cutting coppers—and hence is widely used in the welding and cutting-tip field.

The free-cutting coppers may be machined at cutting speeds approaching those used for machining Free-Cutting Brass. For Tellurium Copper-127, however, carbide-tipped tools are recommended as the inherent copper telluride particles cause somewhat greater tool wear.

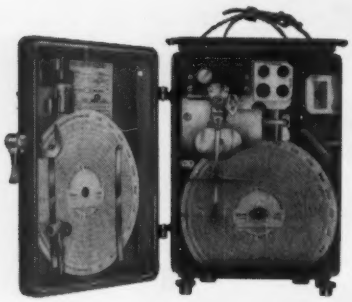
ANACONDA®

FREE-CUTTING HIGH-CONDUCTIVITY COPPER PRODUCTS

Made by The American Brass Company



Bristol Recording Voltmeter for permanent mounting.



Bristol Recording Voltmeter for portable use. Compact Series 631.

Up to 3 elements, 3 pens, per instrument for recording up to 3 independent voltages on a single chart

Nobody can make a recording voltmeter movement like Bristol... field-proved for year-in and year-out dependability and precision. Check these outstanding features:

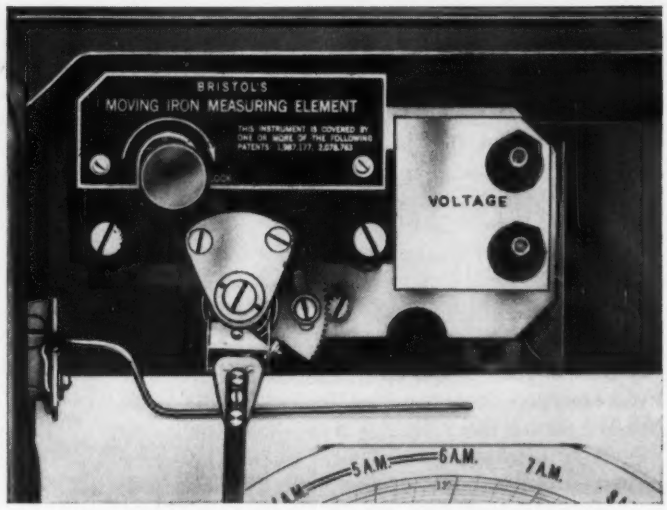
- **Thermistor compensated.** Results in negligible temperature error.
- **High Accuracy.** ±1% of full scale.
- **High-Torque.** The Bristol moving iron mechanism produces greatest feasible torque, keeps weight and power drain to a minimum, assures positive recording over full range.
- **Low Electrical Burden.** Only 5.5 VA at 120V for each mechanism.
- **High Calibration Stability.** Seldom requires calibration.
- **Easy Calibration in Field.** No special tools or skills required.
- **Rugged Construction.** Shockproof ball-bearing movements; pen locking device for shipping or carrying portable models.
- **Leveling Not Critical.**
- **ASA Models Available.** Meet Specification C39.2-1953.

These are just a few of the good reasons it will pay you to standardize on Bristol 1, 2, or 3 pen recording voltmeters. For more facts on Bristol recording voltmeters and ammeters, write for Bulletin E1111.
The Bristol Company, 116 Bristol Road, Waterbury 20, Conn.

0.3

Bristol's rugged, moving-iron element:

Key to RECORDING VOLTMETER ACCURACY and RELIABILITY

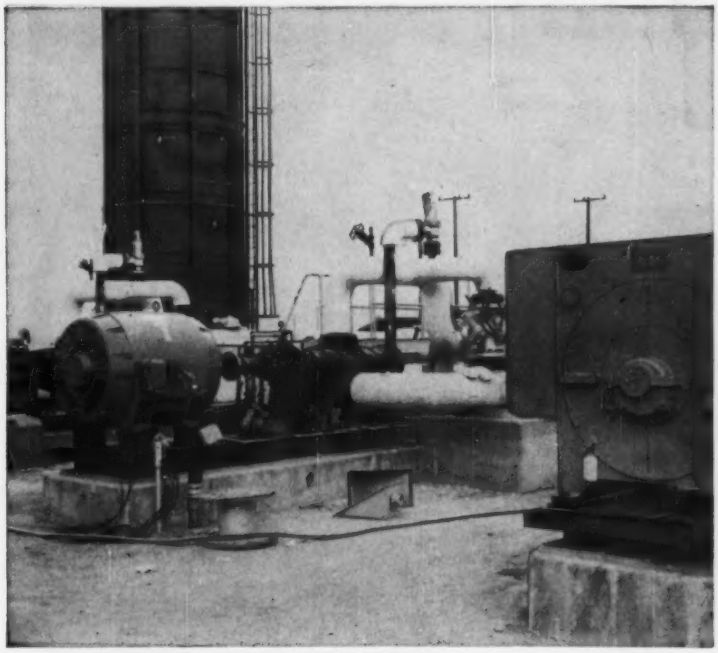


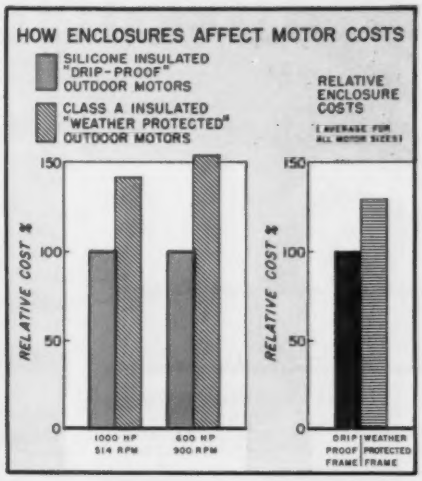
BRISTOL ... for improved production through measurement and control

AUTOMATIC CONTROLLING, RECORDING AND TELEMETERING INSTRUMENTS

SILICONE NEWS from Dow Corning

Banish Costly Enclosures





Save on Outdoor Motors by Specifying Silicone Insulation

Dramatic proof of size and weight savings made possible by motors with silicone insulation systems is demonstrated by these outdoor direct coupled pump drives at the Alamitos Steam Station of Southern California Edison Company. Here, self-protecting silicone rubber insulation means substantial dollar savings in enclosure cost for the smaller, open frame motor.

Both motors have 400-hp ratings. The difference in weight between the two motors is well over 1,000 pounds. Why is one motor so much larger than the other? Because the smaller Allis-Chalmers motor has a self-protected Silco-Flex insulation system incorporating Silastic®, the Dow Corning silicone rubber. The other motor is insulated with conventional materials requiring the protection of a more elaborate enclosure.

Despite its much smaller size, the silicone insulated motor also has a 15% service factor not found in the larger unit. This extra cushion against overloads assures greater reliability and longer life for the smaller unit.

Silicone rubber insulated motors for pump drives, fan drives, or other applications can withstand torrential rains, corrosive fumes, fly ash, dust, salt air, snow, sleet, cold, heat . . . even flooding! That's why it's wise to specify motors with insulation systems made from Dow Corning Silicones for greater reliability and maximum savings.

For more information, write Dept. 3106.

Savings of 30% and better result from specifying motors with insulation systems made from Silastic. Silicone rubber produces a homogeneous, resilient insulation system unaffected by heat, cold, moisture, abrasives, many chemicals and corrosive atmospheres. No need to buy expensive enclosures. Insulation systems made of Silastic are self-protecting, permit open enclosures outdoors where weather-protected frames would otherwise be required. There's no need for a premium priced enclosure to protect the insulation.

What's more, Silastic's extra thermal capacity provides motors, transformers, and other equipment with additional service factor for absorbing overloads. These motors — with a generous service factor *built-in* — add immeasurably to reliable service . . . operate more economically.

SPECIFY Dow Corning Silicones and **SAVE!**

first in silicones

Dow Corning CORPORATION
MIDLAND, MICHIGAN

ATLANTA BOSTON CHICAGO CLEVELAND DALLAS LOS ANGELES NEW YORK WASHINGTON, D. C.

NO MORE ENGINE IDLING

. . . with NEW MOTOROLA MOTRAC* 2-way radio

Idle a truck engine 4 hours a day—to regenerate for battery drain due to 2-way radio—and you waste *more than a hundred dollars* a year in gasoline alone! Add the cost of engine wear, replacement batteries, generators, etc., and you've got a significant cost leak.

But now it's *unnecessary*. Motorola MOTRAC radio uses only a trickle of current—less than a dome light—so engine idling is *out*. And that's just the *start* of MOTRAC radio savings. Truly advanced design and rugged construction give you greater *reliability*, and much longer life.

Here is truly dependable equipment for long-run economy.

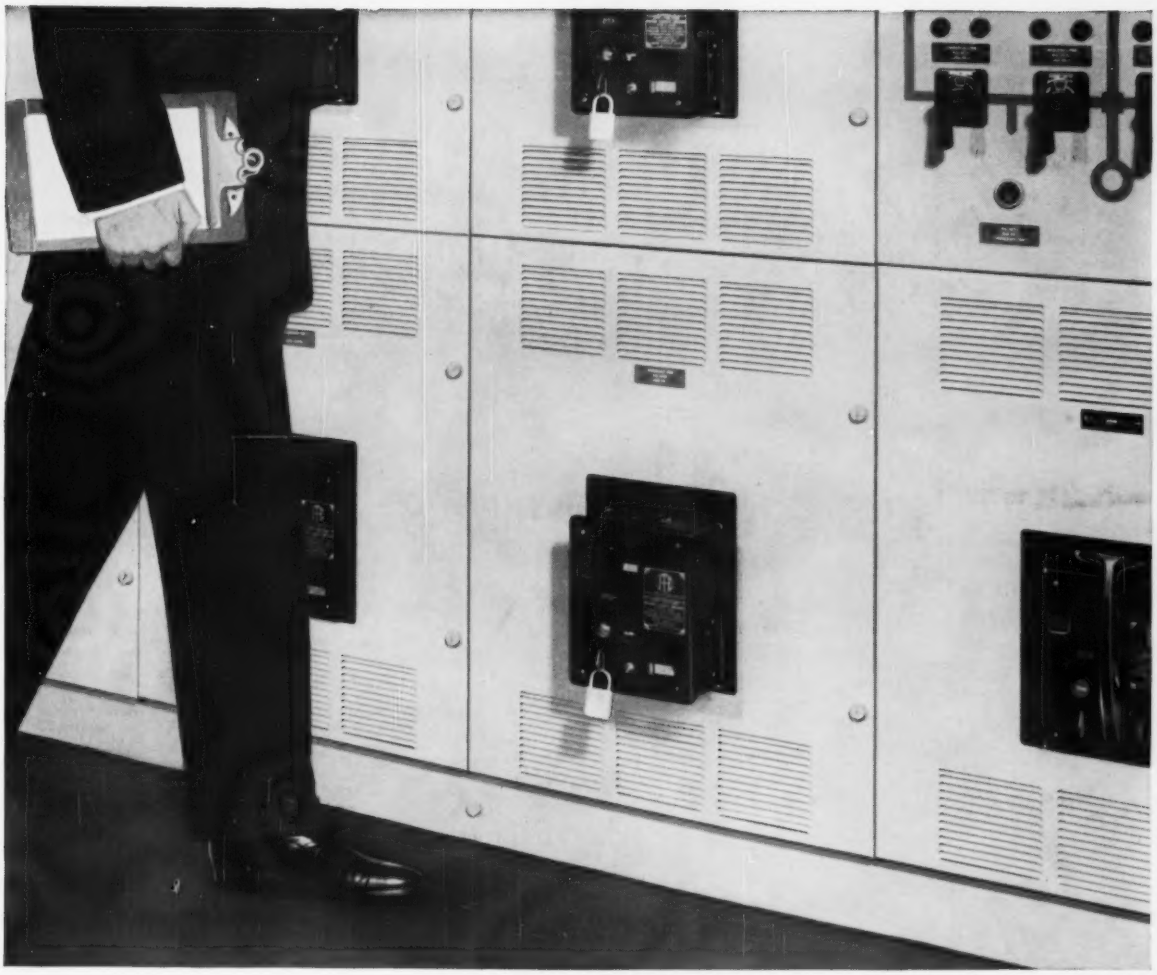
It's a big story. Get all the facts about this outstanding new radio. Call or write today.

HERE'S THE INSIDE STORY—Commonest source of maintenance problems—vibrators and receiver tubes—have been replaced by dependable transistors. MOTRAC radio can be used with any 6 or 12 volt vehicle—positive or negative ground. Models available with up to 100 watts power output.

MOTOROLA 2-WAY RADIO

Motorola Communications & Electronics, Inc., 4501 A[illegible]sta Blvd., Chicago [illegible] A Subsidiary of Motorola Inc.

**MOTRAC is a trademark of Motorola Inc.*



Several of these circuit breakers are in the disconnected position. Yet the doors are safely closed. Wouldn't you like this feature in the switchgear you are going to live with for 20 years?

Why stumble over a circuit breaker door for 20 years?

Don't let yourself be pushed around by a 600 volt switchboard. Fight back. Insist on equipment that lets you rack the breaker out to test or disconnect position without ever opening the door . . . completely safe equipment with no live parts exposed and no open doors to admit dust (see maker's name below).

Only one make of 600 volt switchgear offers this advantage (see name below). In 1957, when this line was introduced, it was the first to give you the miracle of manual stored energy closing. Today, naturally, you expect stored energy in any make of switchgear you buy.

But only this one company (see below) offers the additional advantages of completely closed door disconnect, plus expanded range trip devices that let your breakers grow with your loads. Each trip device has three to four times the range of conventional devices. Saves both cost and downtime.

The surprise is that you pay no more for this—today's most advanced 600 volt gear. Why settle for anything else? For complete descriptive Bulletin 6004-C, write I-T-E Circuit Breaker Company, Dept. SW, 1900 Hamilton St., Philadelphia 30, Pa.

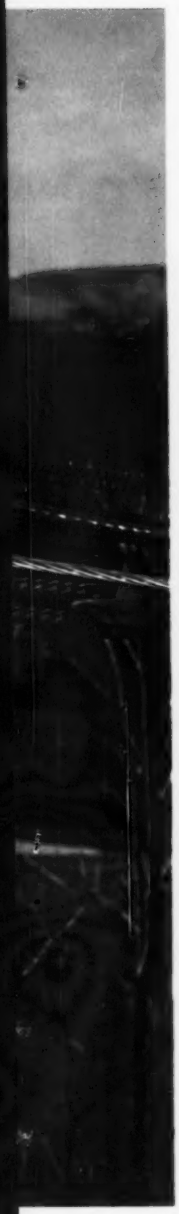
I-T-E CIRCUIT BREAKER COMPANY

THE FASTEST, SIMPLEST, SAFEST WAY TO DEAD-END DISTRIBUTION CONDUCTORS

Philadelphia Electric Company lineman dead-ends 4/0 ACSR conductor with PREFORMED Aluminum Dead-End. The down guy is of ⅜ galvanized steel strand with GUY-GRIP dead-end.

Patented—U. S. Patent No. 2,761,273.

With *Preformed* TRADEMARK CABLED LOOP DEAD-ENDS



which OFFER YOUR COMPANY

1. The most economical Dead-End available
2. UNIFORMITY OF ALL APPLICATIONS
3. Elimination of high stress concentrations
4. Extra holding strength to withstand ice loading and ice dropping
5. Faster, safer application... with ONE-PIECE Preformed DEAD-END

WIDE AREA SUPPORT with continuous line carry

Write for Booklet-of-the Month "Another New Twist"

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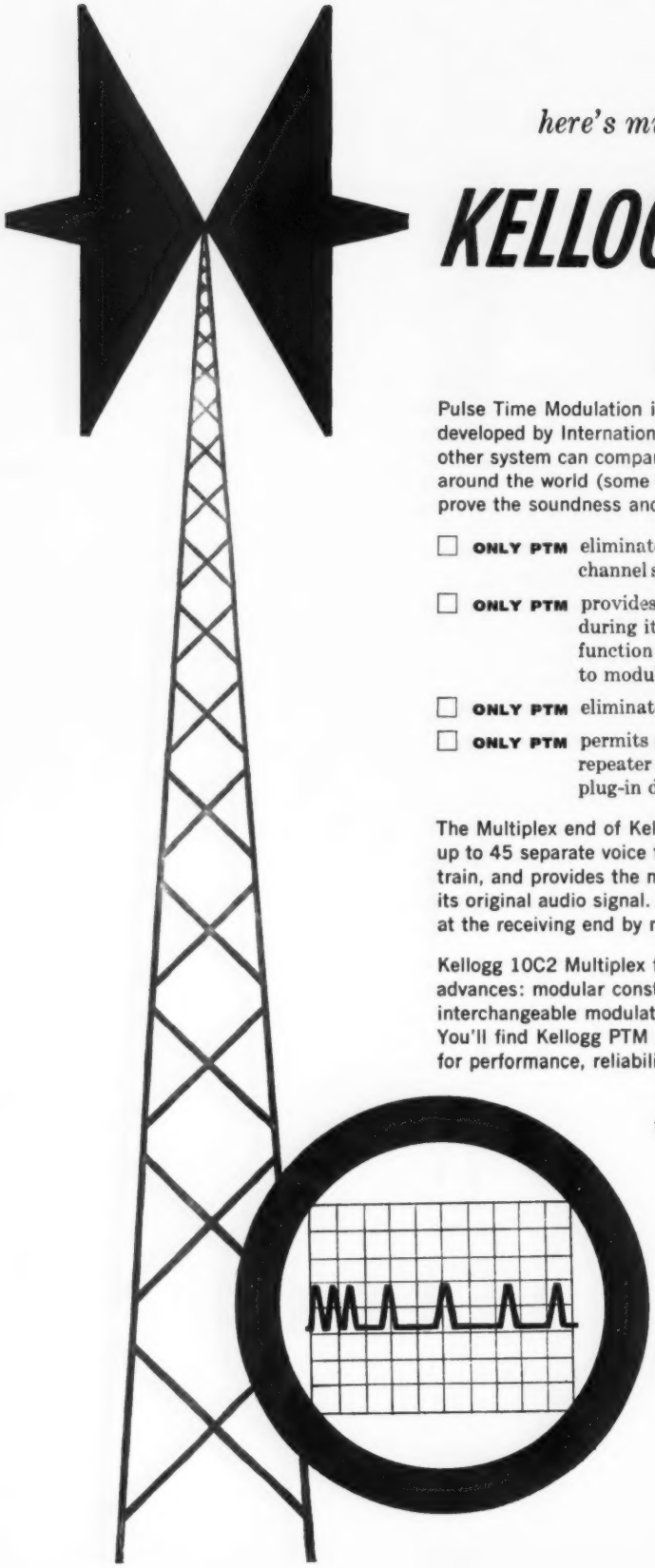


here's microwave at its simplest and best!

KELLOGG 10C2 PTM MICROWAVE

Pulse Time Modulation is the foolproof microwave pioneered and developed by International Telephone and Telegraph Corporation. No other system can compare with it in simplicity and reliability. Installations around the world (some dating back to ITT's early systems in the '30's) prove the soundness and reliability of PTM.

- ☐ **ONLY PTM** eliminates complicated tuning or filtering for voice channel separation. All demodulators are interchangeable.
- ☐ **ONLY PTM** provides separate and distinct channels, open only during its own time interval. Therefore S/N is not a function of channel loading; each channel is insensitive to modulation on the other channels.
- ☐ **ONLY PTM** eliminates frequency displacement over the voice channels.
- ☐ **ONLY PTM** permits *any number* of channels to be dropped at a repeater station. Only one additional modulator and one plug-in demodulator are required to drop each channel.

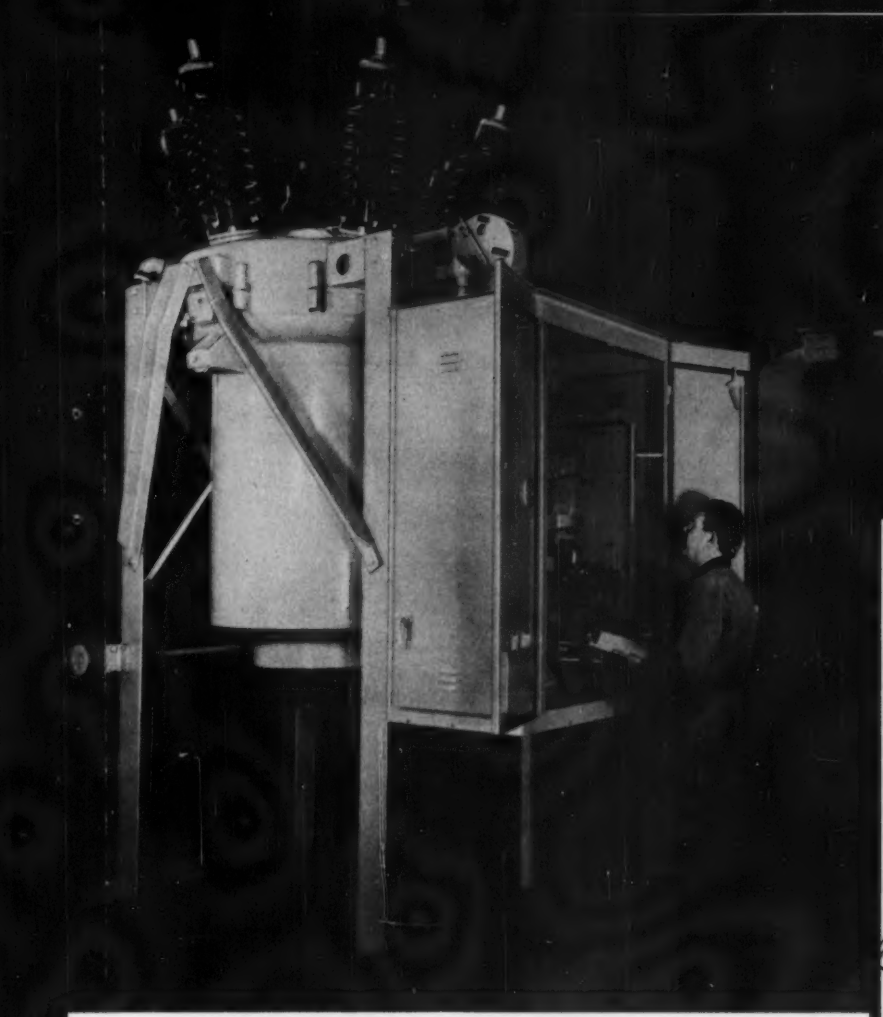
The Multiplex end of Kellogg 10C2 Microwave system can combine up to 45 separate voice frequency channels into a Time-Modulated Pulse train, and provides the means for restoring each of the channels into its original audio signal. Each signal is sorted into its proper channel at the receiving end by means of the distinctive marker pulse it carries.

Kellogg 10C2 Multiplex features the latest and most efficient engineering advances: modular construction, printed circuitry, plug-in channel units, interchangeable modulators and demodulators, and many others. You'll find Kellogg PTM Microwave meets your highest specifications for performance, reliability and engineering design.

Complete technical details will be sent on request. Write to Kellogg's Microwave Division, Box 2725, Raleigh, North Carolina.

KELLOGG Communications Division of ITT
CHICAGO, ILLINOIS

Kellogg Switchboard and Supply Company, 6650 South Cicero Avenue, Chicago 38, Ill. Communications Division of International Telephone and Telegraph Corporation



NEW I-T-E TREND-LINE BREAKERS SET THE PACE FOR SUBSTATION ECONOMIES

- Only One Tank to Lower
- Easy Access to all Internal Parts
- From 30 to 80 Gallons Less Oil
- Saves 20% Maintenance Time

I-T-E, the foremost U.S. manufacturer of switchgear and power interruption equipment, announces an exciting new line of outdoor power circuit breakers—the I-T-E TREND-LINE. Now, substations may employ single-tank breakers in subtransmission ratings with complete confidence in the reliability and performance.

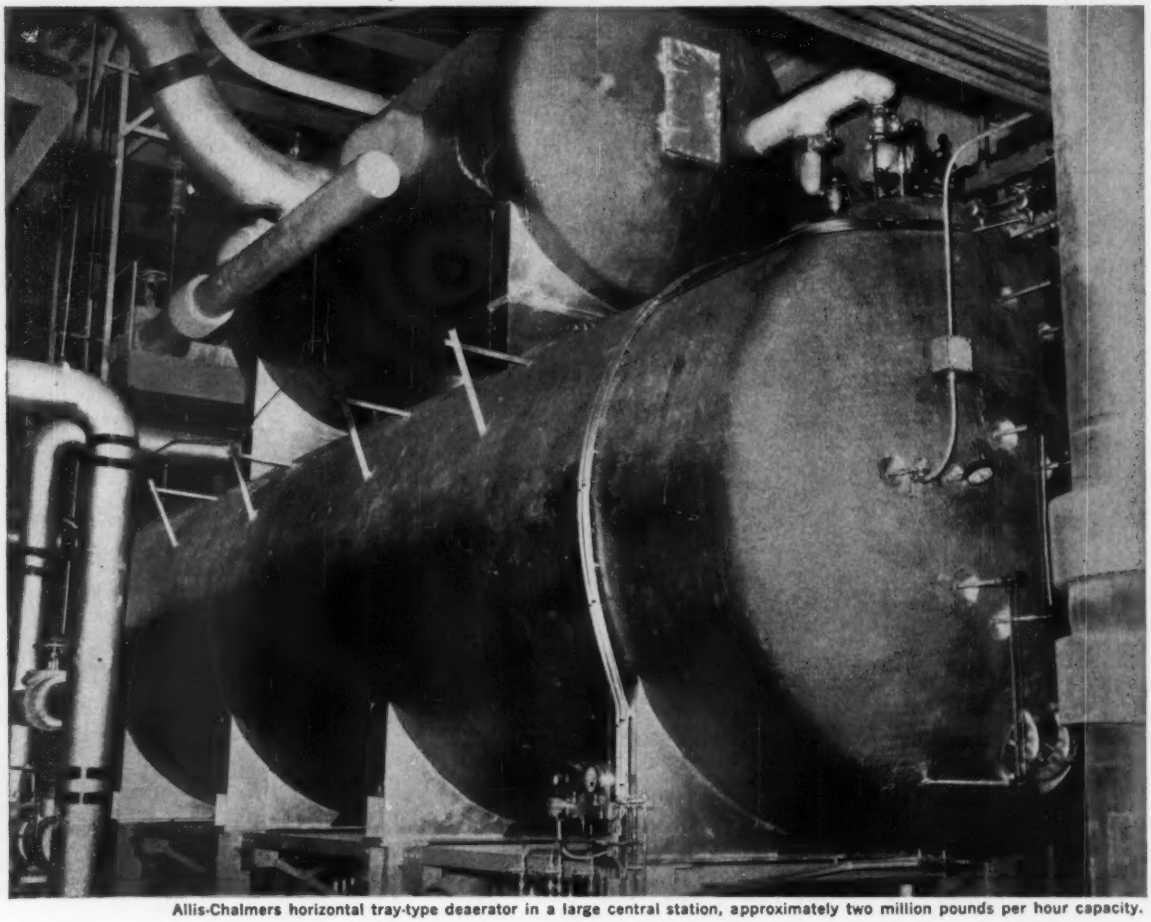
Incorporating a new KOOL-ARC vertical interrupter, these breakers deliver 5-cycle interrupting time as standard performance. Although all phases are contained within a single steel tank, adequate clearance and special tank liners and phase barriers ensure equal or better protection than that afforded by three-tank designs. The new single tank can be easily dropped by one man using an electric tank lifter. With only one tank to service and maintain, substation economies are realized that were previously impossible with the old three-tank designs.

For descriptive literature on the I-T-E TREND-LINE, write to 1667 North Main Street, Los Angeles 12, Calif., Dept. EWO-960-2.

I-T-E CIRCUIT BREAKER COMPANY
KELMAN POWER CIRCUIT BREAKER DIVISION

ALLIS-CHALMERS

A-1221



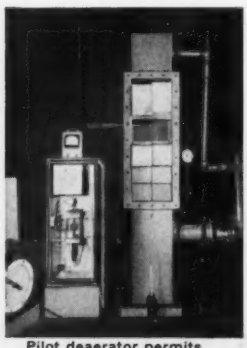
Allis-Chalmers horizontal tray-type deaerator in a large central station, approximately two million pounds per hour capacity.

Iron and Copper pick-up minimized

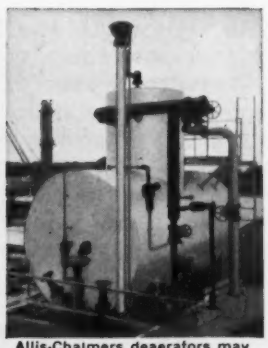
when you switch to Allis-Chalmers deaerators

Positive corrosive gas removal by Allis-Chalmers tray-type deaerators is proved by a pilot unit (below) equipped with a continuous oxygen analyzer and recorder. It utilizes unique counterflow design for thoroughly scrubbing dissolved gases from the water surface. Design produces maximum heating of water with minimum of steam loss in venting. Effective deaeration is guaranteed under all loads, minimizing iron and copper pick-up.

Ruggedly constructed, A-C deaerators employ 16-gauge 18-8 stainless steel on all equipment exposed to corrosive gases. No moving parts assures quiet operation, minimum maintenance. Inspection is easy through ample access doors and manholes. Service? Seventy-seven district offices throughout the nation. Your A-C water conditioning engineer can give you full deaerator details. **Allis-Chalmers,** Power Equipment Division, Milwaukee 1, Wisconsin.



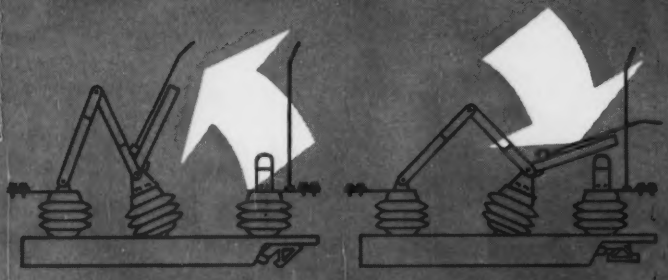
Pilot deaerator permits evaluation of tray designs.



Allis-Chalmers deaerators may be installed indoors or outdoors.

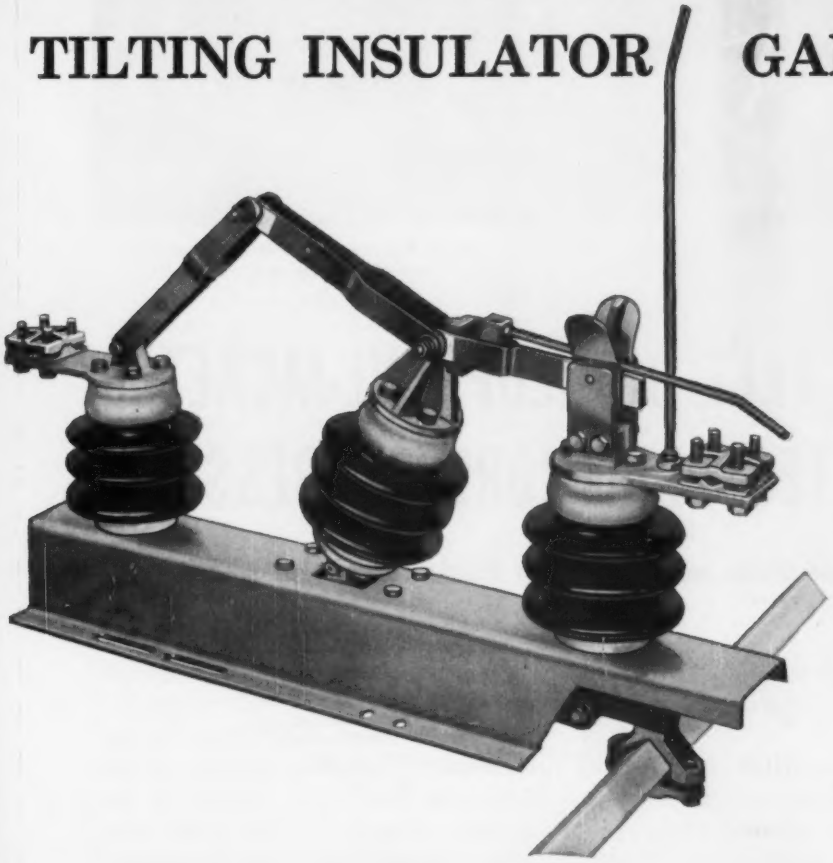
Special **KEARNEY** design for

smooth opening and closing



despite crossarm warpage

TILTING INSULATOR GANG SWITCH



- Switch works smoothly even when crossarms are warped out of alignment, horizontally or vertically, because the specially designed interphase shaft clamp compensates for any structural distortion
- Double leverage frees switch blade of heavy ice coatings: "pry-out" blade action plus toggle action of operating linkage on the tilting insulator
- Longer maintenance-free service in corrosive atmospheres—and in unusually frequent operation—because there is no flexible blade shunt to wear out
- Extra long jaws: adjustment for blade travel need not be critical . . . silver blade to jaw contacts
- Tilting insulator supported by Oilite bearings
- Easy installation . . . interphase shaft can be lifted into clamps after switch is in position

JAMES R. KEARNEY CORPORATION

General Offices: 4224-42 Clayton Ave., St. Louis 10, Mo.

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Industry-proved through a quarter century of service...THERE'S NO DOUBT ABOUT NEOPRENE

Now you can zip through Baltimore at 45-60 mph — even at night. A total of 826 powerful fluorescent lights brighten the roadway, make high-speed driving safer. Neoprene jacketing was specified for over a million feet of illuminating cable used in this installation.

OVER A MILLION FEET OF NEOPRENE-JACKETED CABLE ILLUMINATES BALTIMORE EXPRESSWAY

Tough, pliant, abrasion-resistant neoprene meets Maryland Roads Commission specifications

The Baltimore Harbor Tunnel Expressway—16 miles of limited access dual lane highway—uses over a million feet of illuminating cable . . . and every foot of that cable is jacketed with durable neoprene synthetic rubber. Neoprene-jacketed cable, supplied by Walker Brothers, met specifications set down by the Maryland Roads Commission for lighting cable with a "tough, pliant, abrasive-resisting sheath."

Neoprene jacketing combines toughness and abrasion resistance with many other desirable qualities. It resists weathering, chemicals, temperature extremes and deformation from cable clamps. It has proved—in actual service—that "neoprene jacketing" means long, economical protection for electrical cable. E. I. du Pont de Nemours & Co. (Inc.), Elastomer Chemicals Department EL-6, Wilmington 98, Delaware.

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Better Things for Better Living . . . *through Chemistry*

"Splayed flange" insulation for large transformers

By E. H. Stauffer, Project Engineer, Brown Boveri Corp.

BROWN BOVERI

Insulation materials of different dielectric strength have different angles of diffraction for the electric field. When layers of such dissimilar materials are used in an insulating barrier, stresses concentrate wherever angle changes occur. As a result, the dielectric strength of the insulation as a whole is much lower than for the sum of its components.

Cylinder and cap insulation

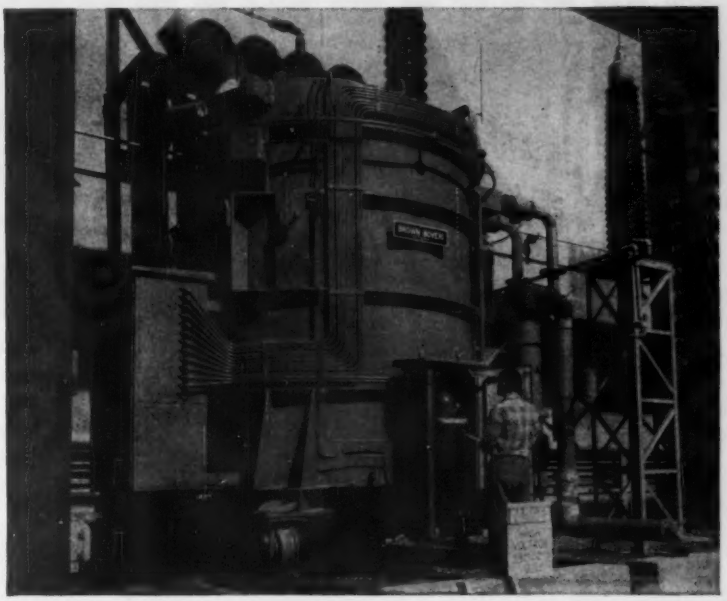
Conventional construction uses concentric bakelized or pressed paper cylinders and caps around the coils . . . with oil filling the spaces between cylinders. The electric strength of this barrier system is limited by the relatively low admissible tangential field forces along barrier surfaces and the dielectric strength of the insulation oil.

As a result, relatively large space is required between windings. This increases impedance as well as size and weight of the transformer.

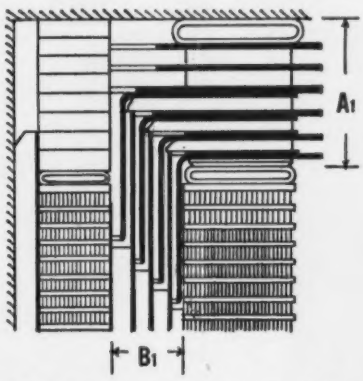
Splayed flange insulation

In all large Brown Boveri transformers, insulation between coils is a continuous wrapper of oil-impregnated paper. This homogeneous barrier, like high-voltage paper cable insulation, has substantially higher dielectric strength than conventional barrier type insulation so that space between windings is reduced . . . with obvious advantages in cost and performance.

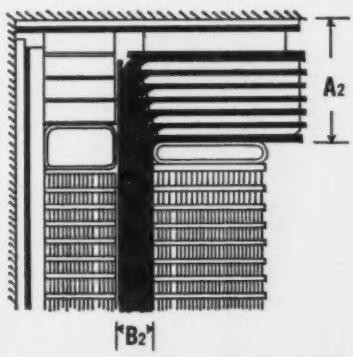
To prevent flash-over at the ends of the coils or between coil and yoke, each layer of paper is scored, bent over the top of the outer coil and splayed out to form a flange. This provides continuous insulation with no joints.



One of 13 Brown Boveri single-phase transformers with splayed flange insulation . . . at Robert Moses Dam, Massena, N.Y. All are 3-winding type equipped with forced oil-water heat exchangers and rated 86,000 kva. Six are 115-13.2/13.2 kv, six are 230-13.2/13.2 kv. The spare is reconnectable for either voltage.



Left: Section through transformer with cylinder and cap insulation. The spaces between cylinders and between cylinders and coils are filled with oil.



Right: Section showing Brown Boveri splayed flange insulation. Space is reduced between coils (B2) and between coils and yokes (A2).

Reduced size and weight

The reduction in space between coils and between coils and yokes allows substantial savings in copper, iron, oil and insulation.

Lower losses

The reduction in space between windings improves field leakage conditions and indirectly results in a smaller iron core, lower no-load losses and a smaller tank.

Hundreds of large Brown Boveri transformers totalling many million kw of capacity are in use . . . with no failures in the splayed flange insulation.

NOTE: Brown Boveri's "radially laminated core" construction is also a factor in reducing transformer size and weight and in increasing efficiency. Details available on request.

BROWN BOVERI Brown Boveri Corp., Dept EW 6 Rector St., New York 6, N. Y. Agents in 27 U. S. cities.

11,078,750 KW

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in low cost, hook-operated disconnect switching...

the DS

unmatched for...

ECONOMY—No other switch of its type offers the combination of features found in the low cost DS. You have a choice of key components to provide the precise performance characteristics to meet your switching requirements, whether on lines or in distribution substations.

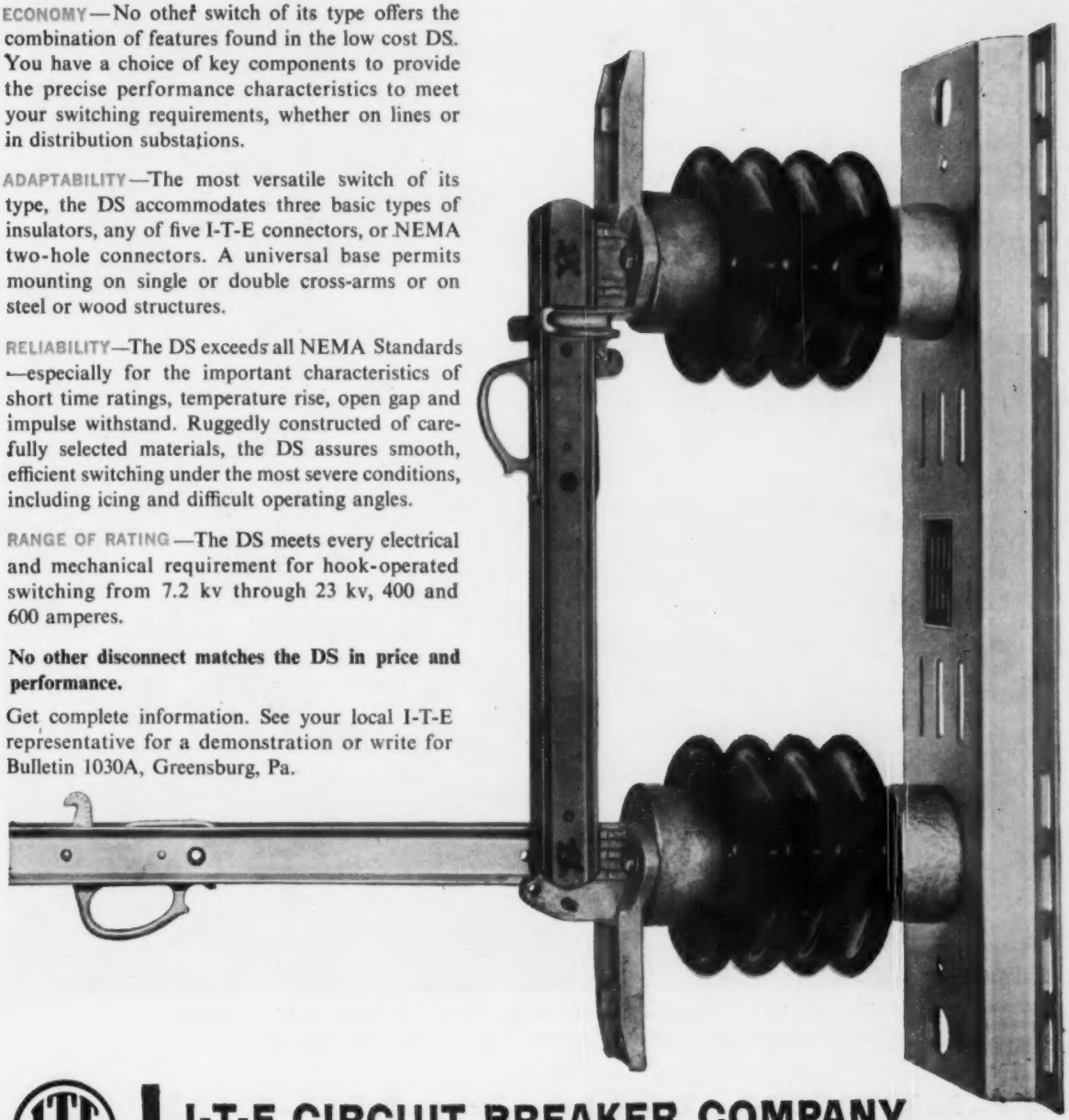
ADAPTABILITY—The most versatile switch of its type, the DS accommodates three basic types of insulators, any of five I-T-E connectors, or NEMA two-hole connectors. A universal base permits mounting on single or double cross-arms or on steel or wood structures.

RELIABILITY—The DS exceeds all NEMA Standards —especially for the important characteristics of short time ratings, temperature rise, open gap and impulse withstand. Ruggedly constructed of carefully selected materials, the DS assures smooth, efficient switching under the most severe conditions, including icing and difficult operating angles.

RANGE OF RATING—The DS meets every electrical and mechanical requirement for hook-operated switching from 7.2 kv through 23 kv, 400 and 600 amperes.

No other disconnect matches the DS in price and performance.

Get complete information. See your local I-T-E representative for a demonstration or write for Bulletin 1030A, Greensburg, Pa.



I-T-E CIRCUIT BREAKER COMPANY

Niagara—2,000,000 kw power plant with turbines built by B-L-H

The most powerful hydraulic turbines ever made in the United States—that's what B-L-H is building for the Niagara Power Project, now under development by the Power Authority of the State of New York. These Francis-type behemoths are each rated at 200,000 hp when operated for highest efficiency at 120 rpm under 300-ft. head.

Scheduled to go into operation next February, the huge main generating plant is a 2,000,000 kw installation that will serve New York, Pennsylvania and Ohio.

Niagara is yet another in the long list of important hydroelectric operations throughout the world—The Dalles Dam, Garrison Dam, St. Lawrence Power Project, to mention only a few of the more recent—that owe their efficiency to B-L-H's 130 years' experience in designing and building hydraulic turbine equipment.

In addition to all four basic types of turbines—impulse, Kaplan, Francis and propeller—B-L-H manufactures governors, surge suppressors, valves, special pumps, and other accessory equipment. For more information and a free copy of our new illustrated Turbine Bulletin 1002, write B-L-H Corporation, Philadelphia 42, Pa., or Pelton Division (B-L-H), 2929 Nineteenth St., San Francisco 10, Calif.

Assembly of stationary non-embedded parts of Francis-type turbine for Niagara.

Turbine stay ring is positioned on pedestals in Unit #1—built by B-L-H—at Niagara Power Project's main generating plant. *Photo courtesy Power Authority of the State of New York.*

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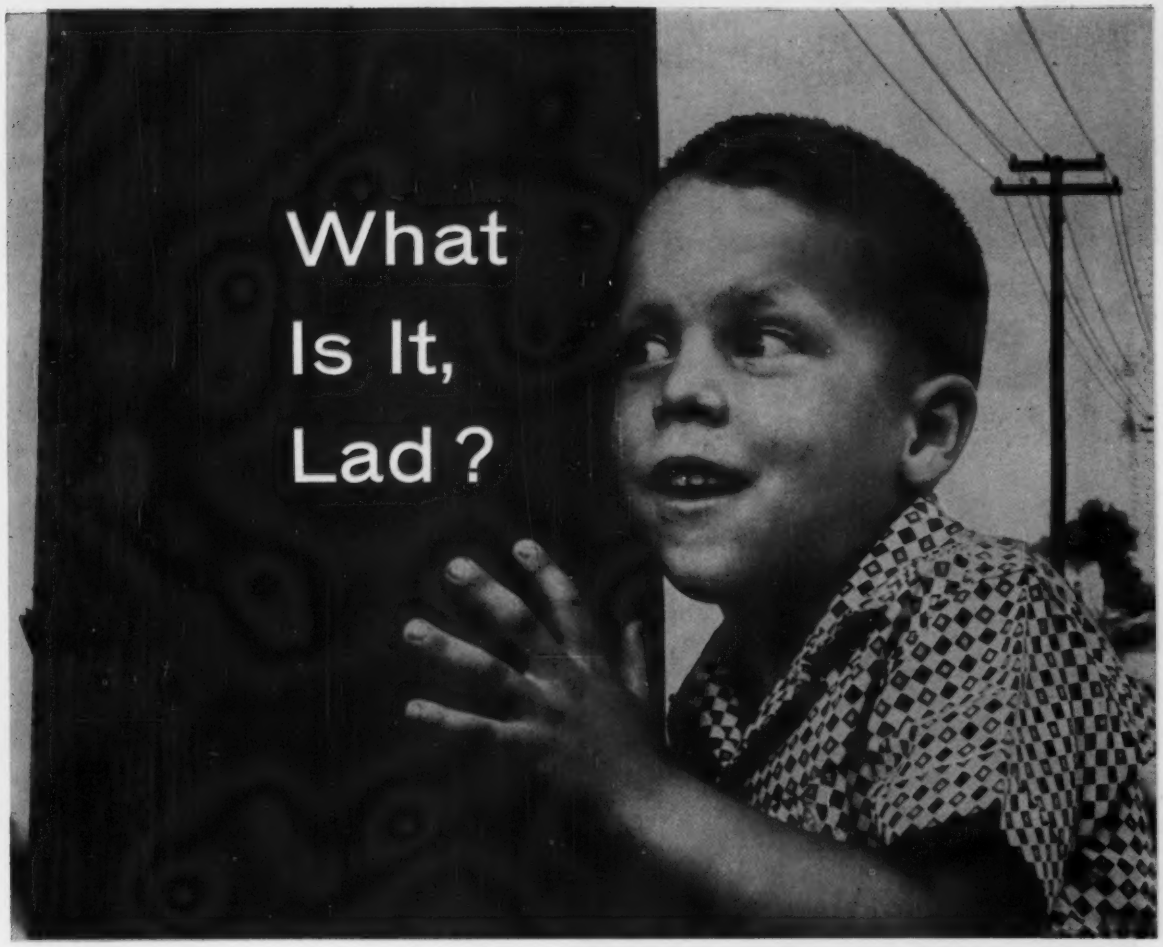
Industrial Equipment Division · Philadelphia 42, Pa.

BALDWIN BLH LIMA-HAMILTON



Westwinds Blowing Through Southwire

Every inquisitive boy has had his curiosity aroused by the hum of wind through wire. Today throughout the nation—west, north, east and south—when a boy places his ear to a utility pole, chances are he'll hear wind blowing through Southwire. Mile after mile of Southwire spans the nation—in high voltage electrical transmission lines, primary and secondary electrical distribution systems and telephone systems. Southwire began as a regional manufacturer just ten years ago. Today we have customers in 44 states and many foreign countries. Thanks to you and our other customers, Southwire has enjoyed a steady growth. We will strive to continue to merit your confidence in the years ahead.

- Bare and Weatherproof Copper and Aluminum Line Wire
- Neoprene, Polyethylene, and VWP (Vinyl) Weatherproof Copper, Aluminum and Triplex
- U.R.C. (DBWP, TBWP) Copper
- Copperweld® Conductors
- Copper and Aluminum Building Wire
- ACSR and All Aluminum Cable
- Galvanized Steel Guy Strand and Static Wire
- Aluminized Steel Guy Strand and Static Wire
- Aluminum Alloy Wire
- Cable Accessories
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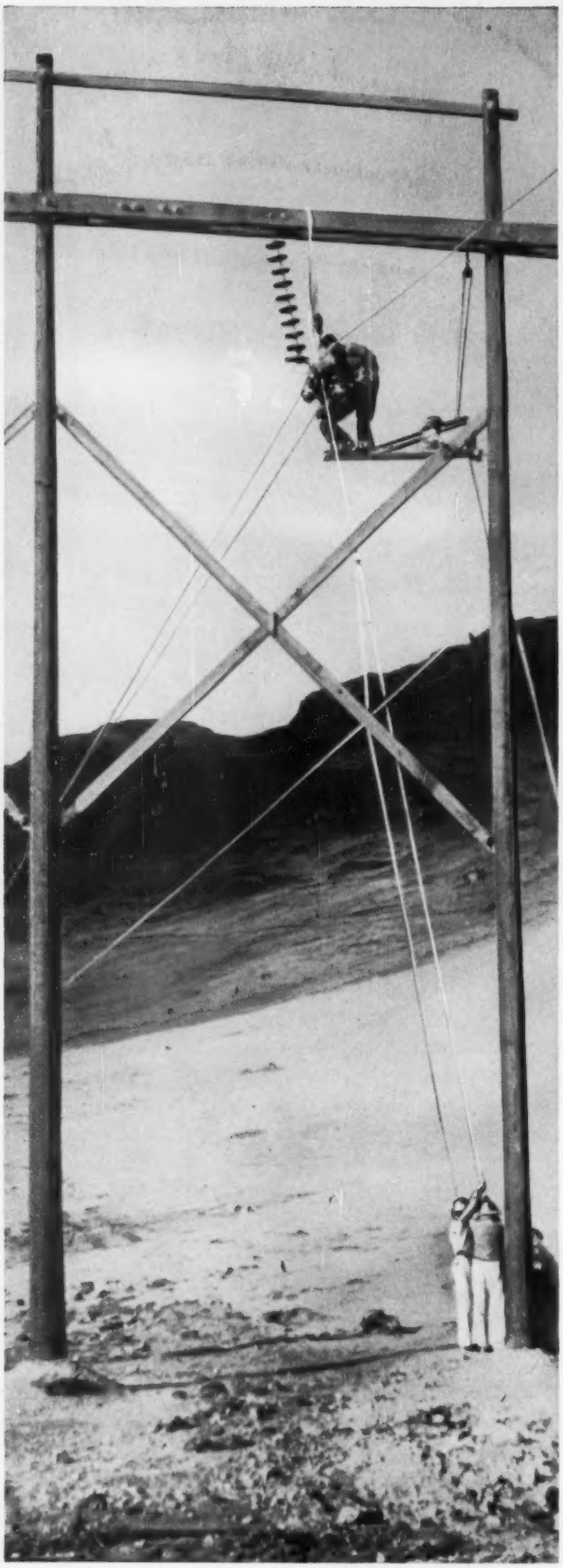

Ebasco Planning– first step to economical electric systems

EBASCO engineers have been working with Utility Companies on the Industry's basic *and* knottiest problems of distribution, transmission, and generation for more than half a century.

Among the gratifying results has been a *lower system cost per customer* . . . as well as an increased efficiency, an improvement in methods.

But what of electric utility facilities today? What of *your* system? Demands for present and future needs are more exacting than ever . . . and in a period of generally skyrocketing maintenance, replacement, and expansion costs in other industries, EBASCO holds the line.

That's why many Utilities call on EBASCO for assistance. EBASCO has an unexcelled record in cutting costs through solid, knowledgeable system planning and unmatched, world-wide experience.

EBASCO engineers are thoroughly acquainted with methods, equipment, construction, operations . . . in *every* phase of the electric utility industry.

Our brochures describe
EBASCO's services and how
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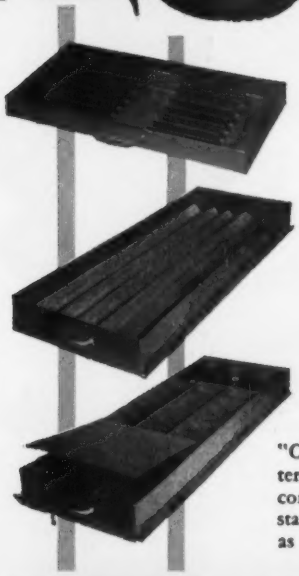

"Custom" features such as material drawers with adjustable compartments are available as standard or optional equipment, as required.

LESS SERVICE HOURS...

plus extra savings in operators time are the results obtained by hundreds of YMR-76 Service Bodies in operation today. That's because YMR-76 units are compact and rugged . . . provide ample and convenient carrying space for materials and tools . . . with capacity for adjustment to meet changing conditions. Write for complete details, price and delivery information today!

CLIP AND MAIL TODAY!

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York, Penna.

Please send me a copy of Bulletin No. 942 covering your YMR-76 Service Body.

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Company_____

Address_____

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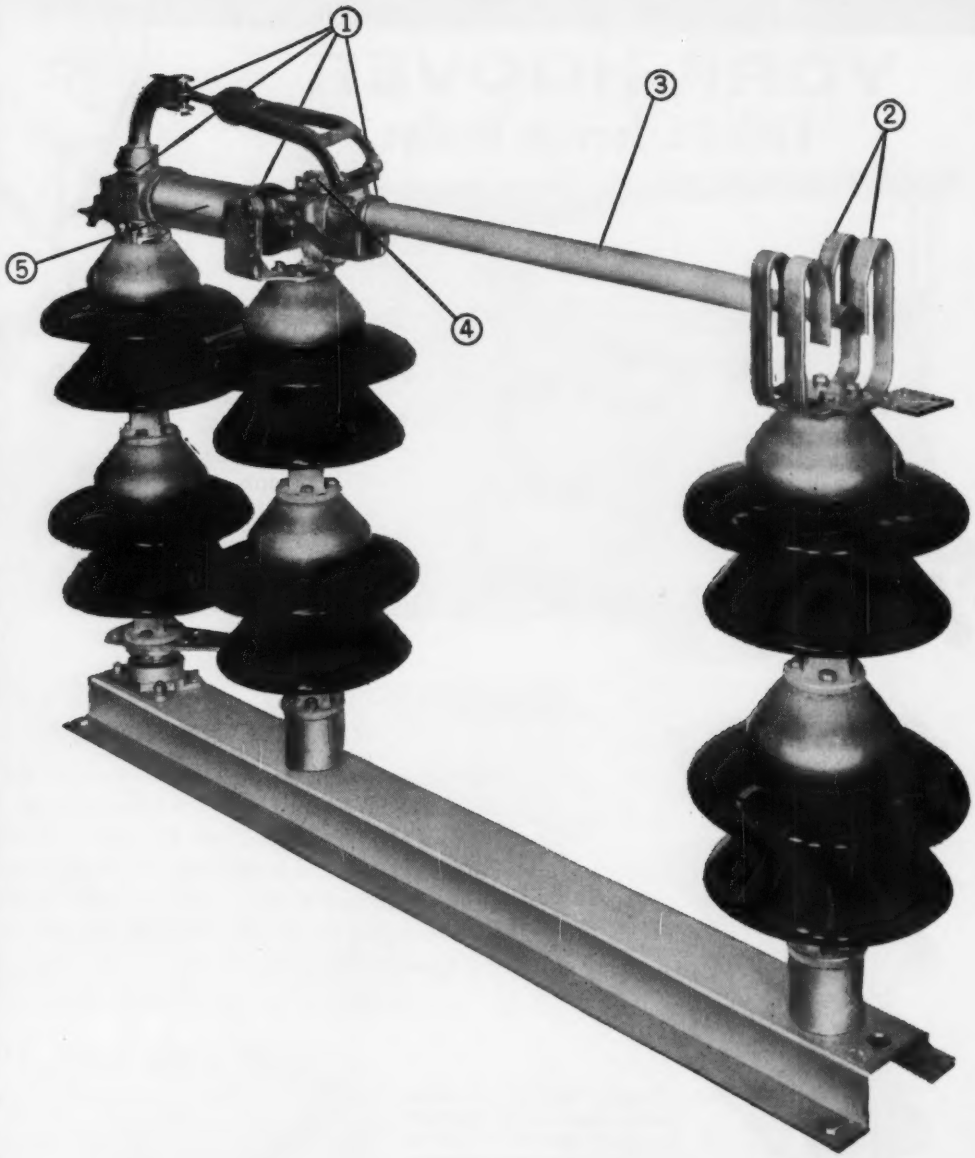
CIRCLE 145 ON READER SERVICE CARD

BODY DIVISION
YORK-HOOVER CORPORATION
YORK, PENNSYLVANIA

CREATIVE ENGINEERING FOR THE PUBLIC UTILITY INDUSTRY SINCE 1892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5

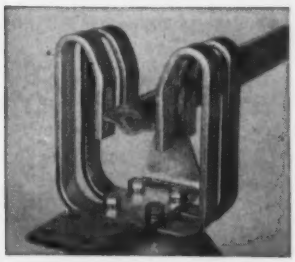
COMPLETELY NEW WESTINGHOUSE V-2 SWITCH PROVIDES TOP PERFORMANCE UNDER TOUGHEST OPERATING CONDITIONS

Another new air break switch? The Westinghouse V-2 air break switch is that—and more! Based on 18 years of continued development on the pace-setting "V" switch, the new V-2 switch is designed functionally to give superior, reliable performance under toughest operating conditions. Here's why:

1. **Teflon-coated bushings** on all live-side bearings assure long life, low-friction operation unhampered by corrosion. Teflon-coated ball-and-socket joint between operating lever and blade lever gives smoother operation, longer life.
2. **Reverse-loop break jaw** is one piece, made of high-conductivity zirconium copper.
3. **One-piece, high-conductivity blade** with form-hardened contact tip.
4. **New enclosure** completely protects solid hinge bridging contact . . . yet bridge is easily removed for inspection. Adjustable joint in blade actuating linkage is also completely enclosed and protected.
5. **Counterbalancing mechanism** is enclosed in horizontal, vertical and underhung mountings. Mechanism rides on teflon rollers for longer life, lower operating effort.

The new V-2 switch retains many of the outstanding mechanical characteristics of the pioneering "V" design—rotating insulator bearing recessed in base; universal operating lever on driven pole; and the ability to function positively, safely under adverse atmospheric conditions, including ice.

FOR MORE DETAILS on the new Westinghouse V-2 switch, contact your nearest Westinghouse sales engineer or write Westinghouse Electric Corporation, P.O. Box 868, Pittsburgh 30, Pa. J-60997-R

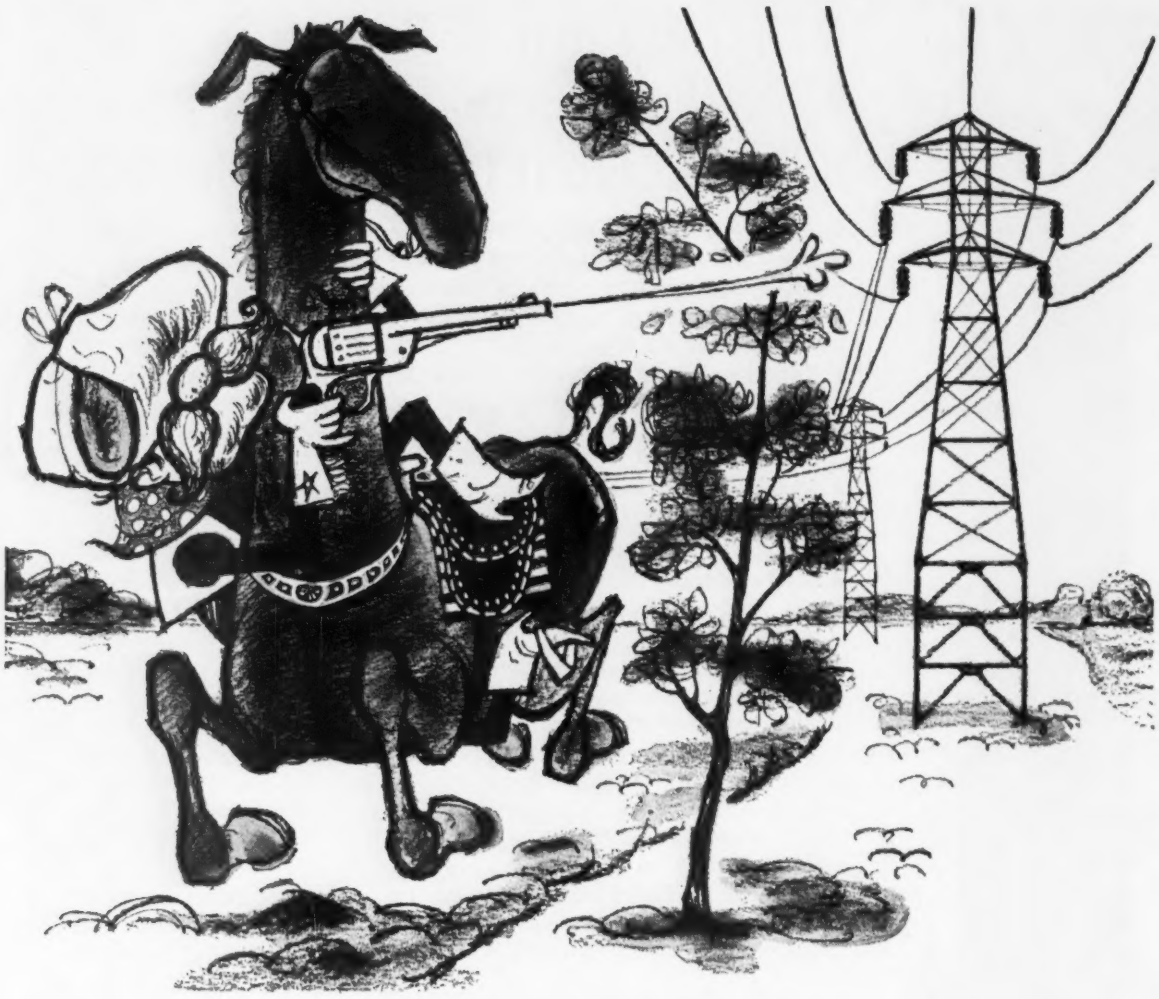


IMPROVED ELECTRICAL CHARACTERISTICS: The V-2 features a new design, single-piece break jaw of zirconium copper which ups break jaw conductivity to over 90 percent, cuts operating effort. Built-in silver inserts give longer life, corrosion-free contacting. And the reverse-loop break jaw shape, plus positive blade and blade stop coordination, eliminates contact burning under fault conditions.

WESTINGHOUSE PIONEERED SHUNT ELIMINATION with the solid hinge-end bridging contact which is now completely enclosed and protected, yet provides easy accessibility for inspection.

YOU CAN BE SURE...IF IT'S Westinghouse

TUNE IN WESTINGHOUSE-CBS TV-RADIO COVERAGE, PRESIDENTIAL CONVENTIONS, JULY 10-29



Meet the LINE RIDER from the Diamond Spread

THE LINE RIDER AND HIS GANG of Diamond Chemical killers are deadly (for weeds and brush, that is). They're inexpensive killers, too . . . and can save your department thousands of dollars a season.

FOR MIXED BRUSH—LINE RIDER LV-3D/3T, a 2-Ethyl Hexyl Ester formulation of 2,4-D and 2,4,5-T containing 3 pounds each of acid equivalent per gallon.

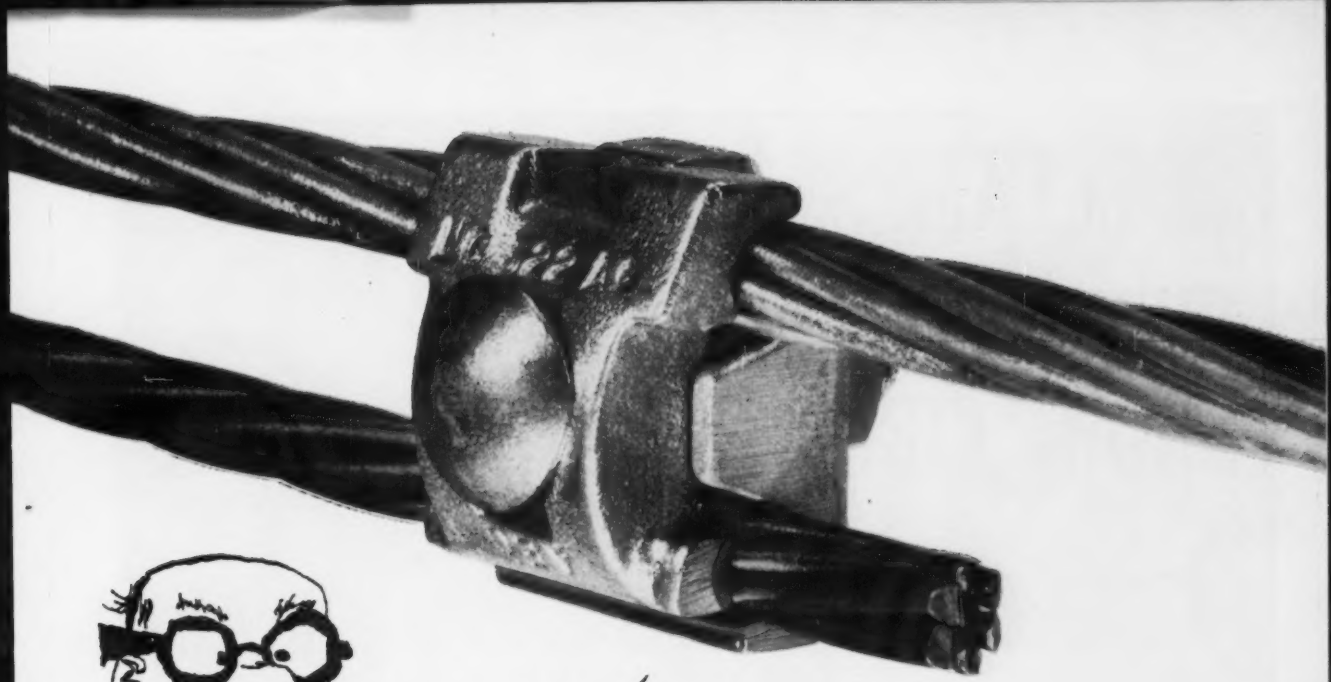
FOR MAPLES AND OAKS—LINE RIDER LV-6T, a 2-Ethyl Hexyl Ester formulation of 2,4,5-T containing 6 pounds of acid equivalent per gallon.

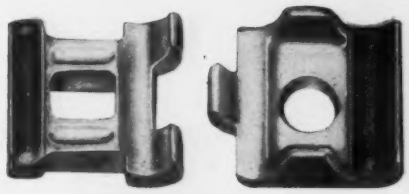
FOR AREAS ADJACENT TO SENSITIVE CROPS—LINE RIDER AMINE 22, alkyl amine salt formulation of 2,4-D, and 2,4,5-T containing 2 pounds each of acid equivalent per gallon. Applied as a water-borne spray.

FOR SPECIAL CONDITIONS—Also available are other standard LINE RIDER formulations, including Butyl and Low Volatile Esters of 2,4-D and 2,4,5-T containing 4 pounds of acid equivalent per gallon.

If you want deadly marksmanship, send for new LINE RIDER brochure giving details. Write Diamond Alkali Company, 300 Union Commerce Building, Cleveland 14, Ohio.

Diamond Chemicals





Bonded Copper Liners Eliminate Corrosion

in Aluminum-to-Copper Connections

During the past 30 years, more Anderson aluminum-to-copper connectors have been used than any other brand! Why? Look to the liners.

- Unique metallurgical bonding method intimately joins copper liners to aluminum connector grooves.
- Bonded copper liners prevent direct aluminum-copper contact, provide a low resistance current path, eliminate corrosion.
- Resilient bond equalizes dissimilar expansion of the aluminum and copper.
- High strength aluminum alloy clamp insures high pressure connections.
- Interlock fingers guide proper alignment during installation.

No wonder, as our mad scientist Andy says, "They're used by the millions!" See your Anderson man soon for details.

ANDERSON ELECTRIC CORPORATION • BIRMINGHAM 1, ALABAMA

ANDERSON ELECTRIC

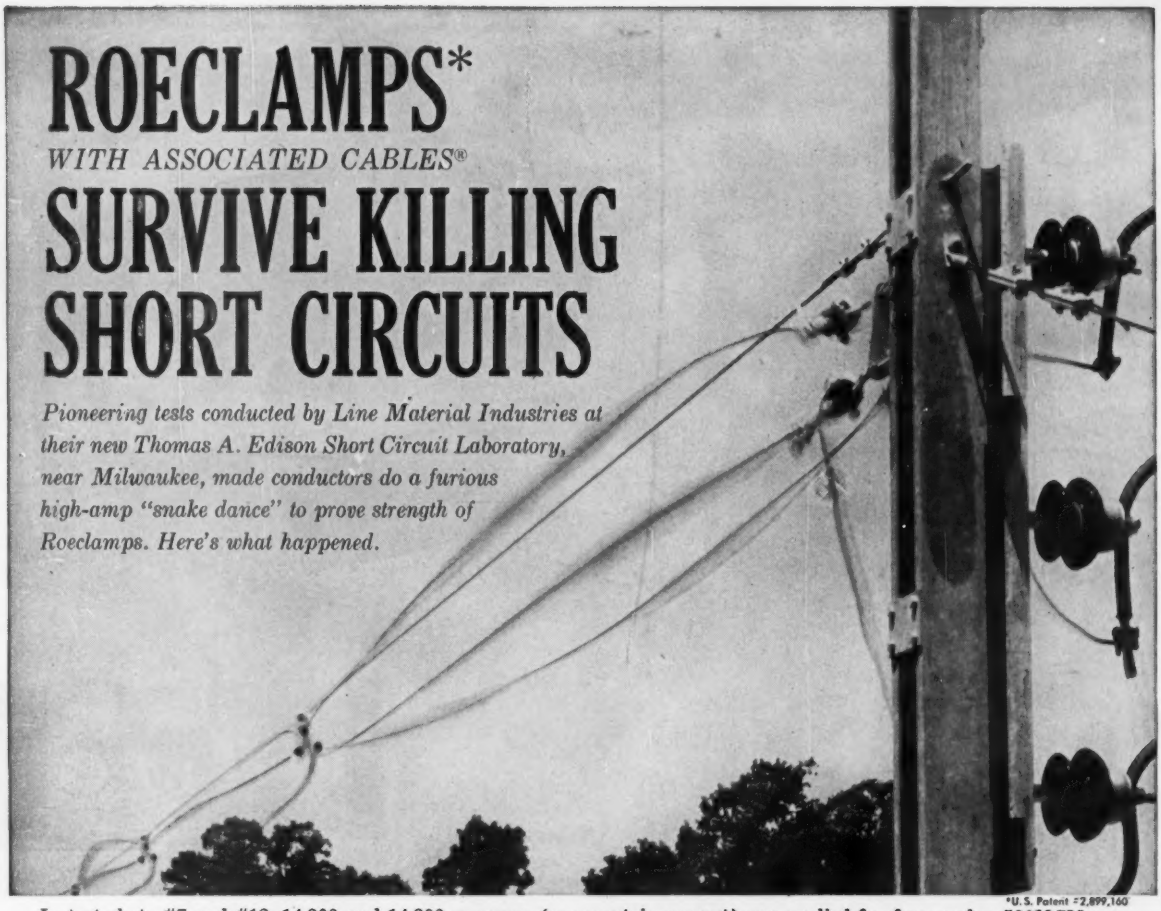
Research / Quality / Performance / in Aluminum and Bronze Products

ROECLAMPS*

WITH ASSOCIATED CABLES®

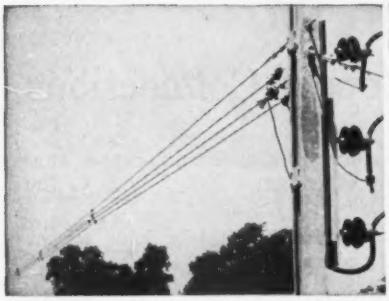
SURVIVE KILLING SHORT CIRCUITS

Pioneering tests conducted by Line Material Industries at their new Thomas A. Edison Short Circuit Laboratory, near Milwaukee, made conductors do a furious high-amp "snake dance" to prove strength of Roeclamps. Here's what happened.

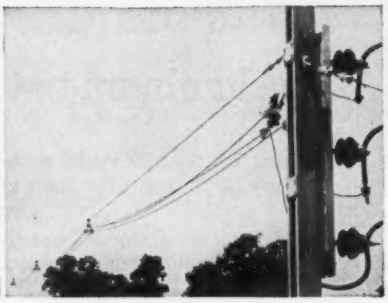


*U. S. Patent #2,899,160

In test shots #7 and #12, 14,300 and 14,200 amperes (asymmetric current) are applied for four cycles. 500MCM conductors are whipped around with incredible force. Strong 5KV and 15KV Roeclamps contain the cables, and withstand this fantastic overload. These were two of over a dozen test shots conducted in the impartial Line Material laboratory.



Roeclamps and various sized associated cables were installed in 128 feet span, shorted at far end and linked with power source and controls inside Line Material Industries' new laboratory. Every 30 feet a Roeclamp holds cables and messenger firmly in place. Roeclamps require no installation tools, can be mounted in less than a minute, even with "boxing gloves" on.



In test shot #2, 3950 amperes (asymmetric current) was applied for 30 cycles to a #6 AWG conductor. This was approximately 100% beyond the rated thermal capacity of the insulation. Note that the 5KV Roeclamps are undamaged. In this test the intense heat (conductor temperature 395°C) elongated the cables but they soon resumed their former profile.

Line Material Industries' short circuit Lab features a closed circuit TV Monitor panel to observe testing. It has the most modern metering equipment, and the world's highest speed, 60-cycle generator for short circuit testing. This can deliver over 500,000 KVA of electrical energy momentarily. A 1,500,000 KVA air blast breaker can interrupt 80,000 amperes after any pre-set current flow.

NOW ON FILM

SEE THESE STARTLING TESTS OF ROECLAMPS WITH ASSOCIATED CABLES FOR YOURSELF

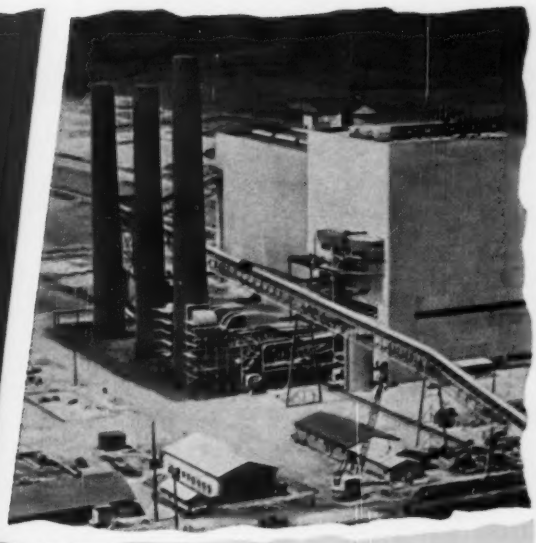
A 16mm color movie, showing the complete series of tests is now ready for showing to technical groups. For details write to Line Material Industries, McGraw-Edison Company, 700 W. Michigan Street, Milwaukee 3, Wis., or to Roebling's Electrical Division, Trenton 2, New Jersey.

ROEBLING

Branch Offices in Principal Cities
John A. Roebling's Sons Division
The Colorado Fuel and Iron Corporation

CF&I JAR

plant designs...



TO MEET GROWING power demands

Stone & Webster's skill and experience have added long-term profitability to industrial plants all over the world.

Achieving plant efficiency and output, meeting schedules and budgets are the goals of each Stone & Webster power project. Stone & Webster designs have been vital to an era of dramatically expanding power demands resulting in economical expansion for increased kilowatt capacity.

Stone & Webster Engineering Corporation, working closely with your own engineers, can furnish complete design and construction services for new power station facilities, or is prepared to assist in any phase of your next engineering project. Please write or call our nearest office.

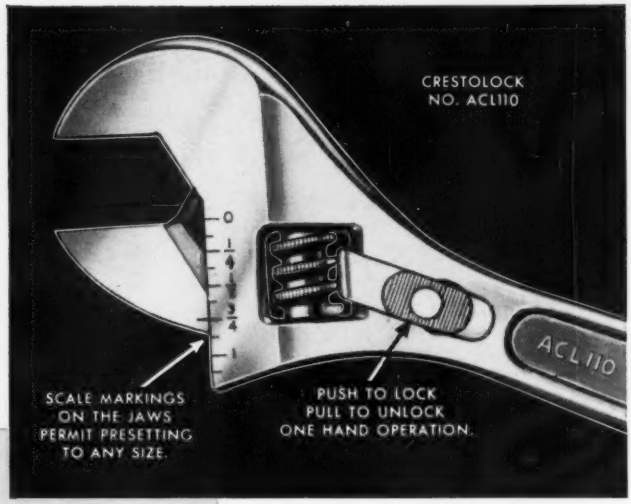
STONE & WEBSTER ENGINEERING CORPORATION

A SUBSIDIARY OF STONE & WEBSTER, INC.

New York Boston Chicago Pittsburgh Houston San Francisco Los Angeles Seattle Toronto

THERE IS NO OTHER LOCKING WRENCH LIKE CRESTOLOCK®

CRESTOLOCK is a practical, dependable adjustable wrench that can be locked at any infinite opening size within its capacity. It's the famous Crestoloy Wrench PLUS a simple, positive, thumb-operated locking device. There's no strain on the lock...no projections. Once locked, it stays locked until you change it. Available in 8, 10 and 12 inch sizes, chrome plated with stainless steel locking device.



Sold by Hardware Dealers and Industrial Distributors everywhere.

NO OTHER WRENCHES LIKE CRESCENT

CRESCENT and CRESTOLOY Wrenches are made by the originators of the 22½° adjustable wrench. They have been widely copied but never equalled for design, balance, quality and all-around performance. The buyer who wants top value in tools insists on CRESCENT.

Crescent is our trade-mark, registered in the United States and abroad, for wrenches and other tools. Sold by leading distributors and retailers everywhere and made only by

CRESCENT TOOL COMPANY, JAMESTOWN, NEW YORK

Central's NEW

OWL
OVERLOAD WARNING LIGHT

gives POSITIVE indication that transformer hot spot copper temperature has exceeded 105° C.

It provides the Utility with a simple, inexpensive guide to transformer thermal load condition. It is clearly visible from a cruising service truck. It responds to coil temperature rather than top oil temperature.

- O-W-L is lightweight and small but very rugged—not subject to easy damage in shipping and handling.
- O-W-L is simple and easy to re-set, either by hand or with hot stick.
- O-W-L is designed to permit removal of core and coil assembly without removing the light.
- O-W-L does not interrupt service in any way. Replacement or other system changes can be made at Utility's convenience.

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Sales Offices in Principal Cities
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Plants at Pine Bluff, Arkansas, and Arcadia, Florida

NEMA

NEW UTILITY STATIONS, C-E EQUIPPED

Includes only new stations on *new* sites placed in operation since JANUARY 1, 1950.

LAKE CATHERINE
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OAK CREEK
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MONTROSE
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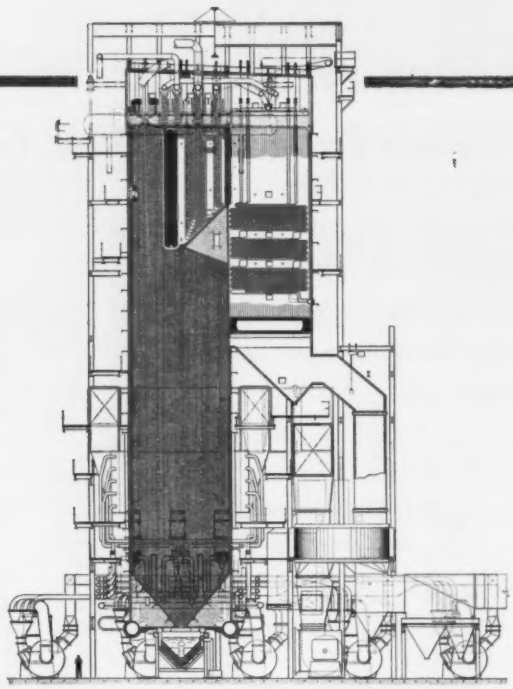
LEWIS and CLARK
ROY S. NELSON
YUMA AXIS
DICKERSON
DAN E. KARN
WILLOW GLEN
OCOTILLO

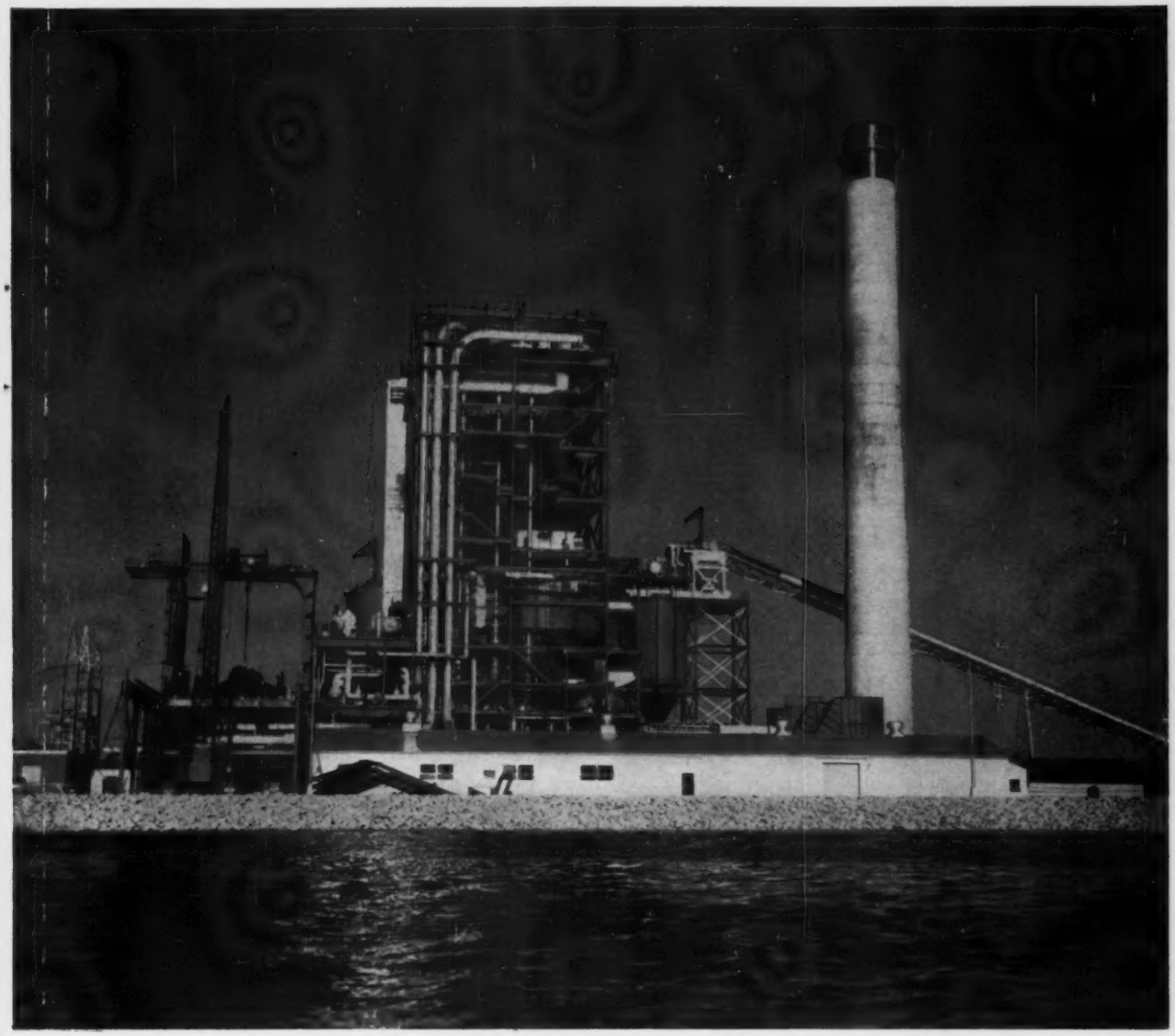
Darlington County

New Darlington County Plant

Goes into service



The C-E unit shown above is now in service at the Darlington County Steam Electric Generating Plant of the Carolina Power & Light Company. It is a controlled-circulation, radiant, reheat boiler of the divided furnace type with reheater surface located between the primary and finishing superheater sections. This primary superheater surface is located in the rear pass with an economizer section below it. Regenerative type air heaters follow the economizer surface. The unit is pulverized coal fired, using bowl mills and tilting, tangential burners. Arrangements are made to use natural gas in the future if desired. This is an "outdoor" unit.



Carolina Power & Light Company recently put on the line the largest single generating unit in the CP & L service area when its new Darlington County Steam Electric Generating Plant was added to the system. Ebasco Services, Inc., were the consulting engineers.

Located near Hartsville in the Pee Dee section of South Carolina, this will be the 15th generating plant of the CP & L system, and its 10th generating unit installed since World War II. It brings system capability to above 1½-million kw.

This first unit in the Darlington County Plant will have a net capacity of 185,000 kw, operating at a throttle pressure of 1800 psi and a steam temperature of 1000 F, reheated to 1000 F. Ultimate capacity of the station is planned to be above one million kilowatts.

The new unit is served by a C-E Controlled Circulation Boiler. A cross-sectional elevation and brief description appear on the opposite page.

C-278

COMBUSTION ENGINEERING

Combustion Engineering Building • 200 Madison Avenue, New York 16, N. Y.

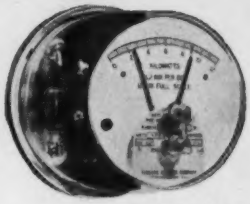
ALL TYPES OF STEAM GENERATING, FUEL BURNING AND RELATED EQUIPMENT; NUCLEAR REACTORS; PAPER MILL EQUIPMENT; PULVERIZERS; FLASH DRYING SYSTEMS; PRESSURE VESSELS; SOIL PIPE

Why call it "Demand"? Wouldn't you prefer to use one of the terms employed to describe the "demand" function of the Sangamo meters shown here?

Type KVAR for thermal kvar *"requirements"*

Type LA for polyphase thermal kva *"load peak"* and kwh

Type J2T for singlephase thermal kw *"use"* and kwh

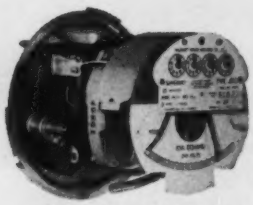


Type WD for thermal kw *"discount value"*

Type PW for polyphase thermal kw *"capacity charge"* and kwh

Type TDT thermal *"load" transmitter* for telemetering

Type LVA for polyphase thermal kva *"capacity"* and kwh



Type J2A for singlephase thermal kva *"load factor"* and kwh

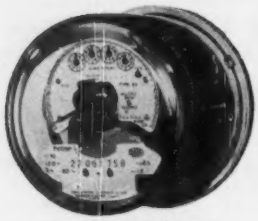
Another Sangamo Electric report on the

Regardless of what you call "Demand" measurement, you can depend on Sangamo Meters to do it better...

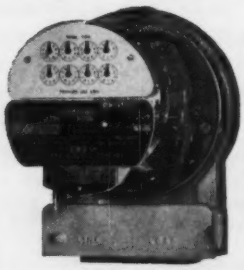
Sangamo offers the most complete line of demand* measuring instruments in the industry... equipment to indicate and record demands from the smallest values to the largest encountered by the electric power industry. The line includes singlephase and polyphase Type D

SANGAMO ELECTRIC

SPRINGFIELD,



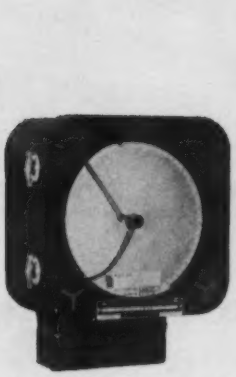
Type P4D for polyphase mechanical kvar *"selected service"* and kvar hours



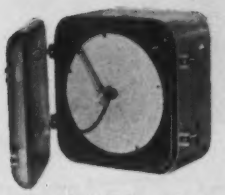
Type JD differential registers for *"energy factor"* billing

Type P2D for polyphase mechanical kw *"peak use"* and kwh

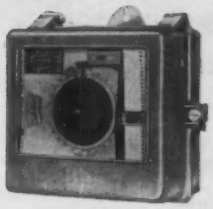
BM60-1



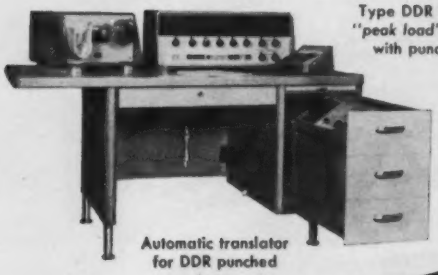
Type CCW for thermal graphic kw "*integrated peak power*"



Type CCVAR for thermal graphic kvar "*availability*"



Type DDR for digital "*peak load*" recording with punched tape



Automatic translator for DDR punched tape

use of the word 'Demand' in metering

Several months ago, in these pages, we questioned the use of the word "demand" as it is applied to billing. The point was made that it is time for all of us to reconsider our use of the word, and we asked for your opinions and suggestions about what to do with this industry bogey-man.

Your response to our question was immediate. Answers came from all over the country, Canada, and South America. You were practically unanimous in agreeing with us . . . it is time to take the "demand" out of demand metering, and substitute some less offensive and more easily understood term.

Now, we believe that we have received enough suggestions to give us a representative sample of your feelings, likes and dislikes. We've counted and catalogued these suggestions (note: the most popular terms have been used in the product captions) and have listed the three that were mentioned most often on the ballot you see below. (We've also left space for a write-in vote if you would like to suggest still another term.) Won't you cast a vote for the term you think would do the best job of solving this thorny public relations problem, and mail it to the address shown on the ballot?

mechanical demand registers, Lincoln indicating and graphic demand meters, digital demand recorders and translating systems for Kw, Kvar, and Kva demand. You'll do well to look to Sangamo first for all types of demand measurement instruments.

*Until your vote is cast, and you've selected a new term.

COMPANY
ILLINOIS

Type J2D for singlephase mechanical kw "*power supply*" and kwh

Type P3D for three stator polyphase mechanical kw "*service capacity*" and kwh

BALLOT

Let's take the "demand" out of demand metering. Vote for the term you feel best describes this phase of metering. Check your choice.

☐ Capacity ☐ Load
☐ Load Peak ☐ _____

Name_____
Position_____
Company_____
Address_____
City & State_____

Clip and mail to:

SANGAMO ELECTRIC COMPANY
MARKET RESEARCH DEPARTMENT
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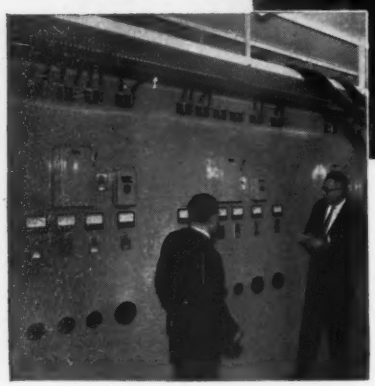
Blackburn's

New Testing Facilities

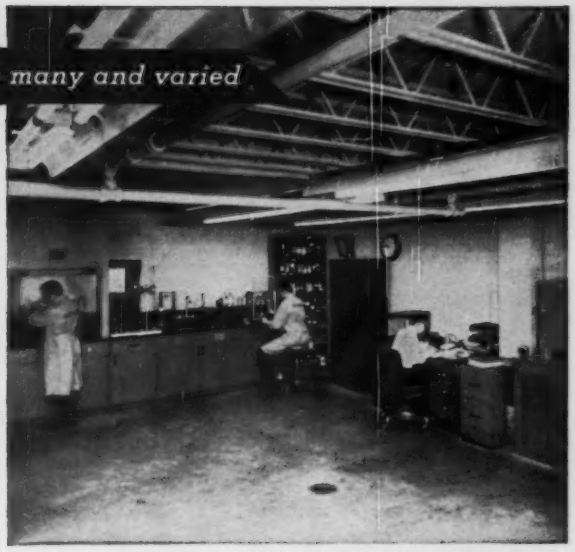
give accurate test data for utilities, precise evaluation of design ideas



PART OF THE CONTROL PANEL of Blackburn's recently completed current cycling laboratory. John A. Toedtman, Chief Engineer (left), and Ken Way, Vice President, observe tests in progress.

NEW CURRENT CYCLING LABORATORY features virtually draftless air conditioning and a means of closely controlling ambient temperatures throughout the test area. Control of these factors permits truly precision testing of connectors. This photo shows Blackburn laboratory technicians taking resistance and temperature measurements of test connections. These new facilities permit testing of more than 500 connectors simultaneously. Advanced testing facilities like these enable Blackburn to provide you with the proper fitting for every operating condition.

. . . and the tests are many and varied



THE GENERAL LABORATORY, a portion of which is shown here, is the scene of a great variety of tests. Hardness, yield and breaking strength of parts such as castings, bolts, etc., are determined. Special equipment is available for pull-out or holding force evaluation of all fittings. Clamping force measurements giving the relationship between tightening torque and the force exerted by the connector on the conductor are made here. Microscopic examinations and special electrical resistance measurements are routine. Tests like these give Blackburn fittings great dependability.

THE CHEMICAL LABORATORY is the center for tests to control various chemical process solutions used in production. Electroplating, etching, and metal cleaning solutions are regularly tested here. In addition, special surface treatments are evaluated for friction control and corrosion protection. Thus, this laboratory assures continuous control of quality.

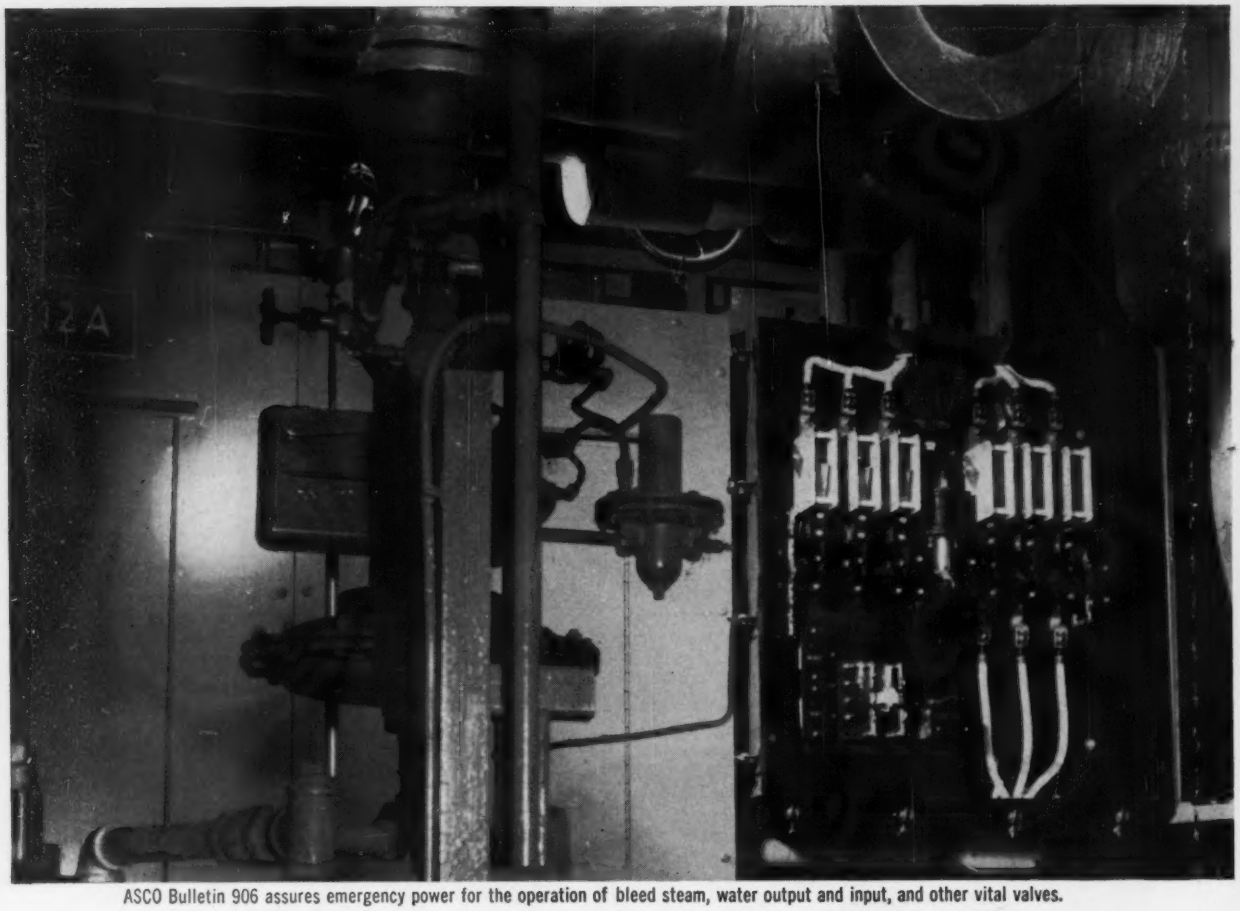
SALT FOG CHAMBER, where tests may continue for hundreds or even thousands of hours. Here salt fog tests are made on wire connections. Test conditions are made in accordance with ASTM specifications. Electrical resistance measurements and visual observations are recorded at regular intervals during the tests.

OUTDOOR EXPOSURE RACKS permit long-term exposure tests which often yield valuable information on weathering resistance not accurately obtainable from more highly accelerated tests. Specimens on these racks generally remain on test for at least a ten-year period.

Look to
BLACKBURN
for
test-engineered
electrical fittings

JASPER
BLACKBURN
CORPORATION

1525 Woodson Rd. • St. Louis 14, Mo. • WYdown 3-9430



ASCO Bulletin 906 assures emergency power for the operation of bleed steam, water output and input, and other vital valves.

FOR ASSURED POWER

ASCO Automatic Transfer Switches Protect Key Equipment at Con Edison's Astoria Station

More than 50 ASCO Automatic Transfer Switches were specified by Con Edison for a variety of situations at its Astoria Generating Station, N. Y., where auxiliary power failure could not be tolerated. They protect generators, insure operation of key valves and control panels, stand ready at all times to transfer loads to alternate sources when normal power fails.

They must be dependable.

Dependability in an automatic transfer switch stems from several features. It must be designed for *continuous duty* in either normal or emergency position. The switch must be able to close safely on inrush currents 20 times full load rating so that contacts will not weld on tungsten lamp load.

Other features include *inherent* interlocking, precluding the possibility of both circuits being open or closed . . . *mechanical locking,* providing high contact pressure, minimum I^2R losses, and assuring that vibration or electromagnetic effects cannot open the con-

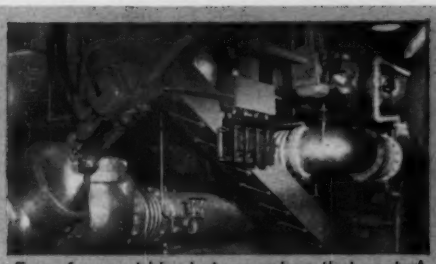
AUTOMATIC TRANSFER SWITCHES SOLENOID VALVES • ELECTROMAGNETIC CONTROL

CONTINUITY

tacts . . . *single coil design,* providing construction simplicity, quiet operation . . . *built in time delay* so the equipment ignores harmless momentary outages.

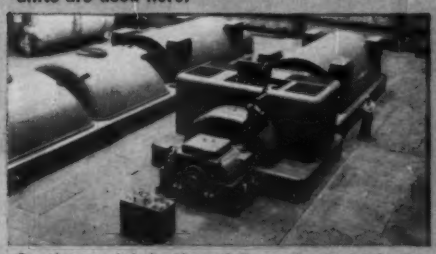
Only ASCO Automatic Transfer Switches satisfy all these essentials in addition to the nominal requirements of transfer switches. For this convincing reason, many engineers are today specifying ASCO — *the one source for a full line of absolutely dependable automatic transfer switches.*

WRITE NOW FOR CATALOG 57-SR1 DESCRIBING HOW TO SELECT AN ADEQUATE AUTOMATIC TRANSFER SWITCH.



Two of several bleed steam valves that control the flow of steam from turbines to the main condensers.

Power source for the operation of instruments on the control panel must not fail. Several ASCO units are used here.



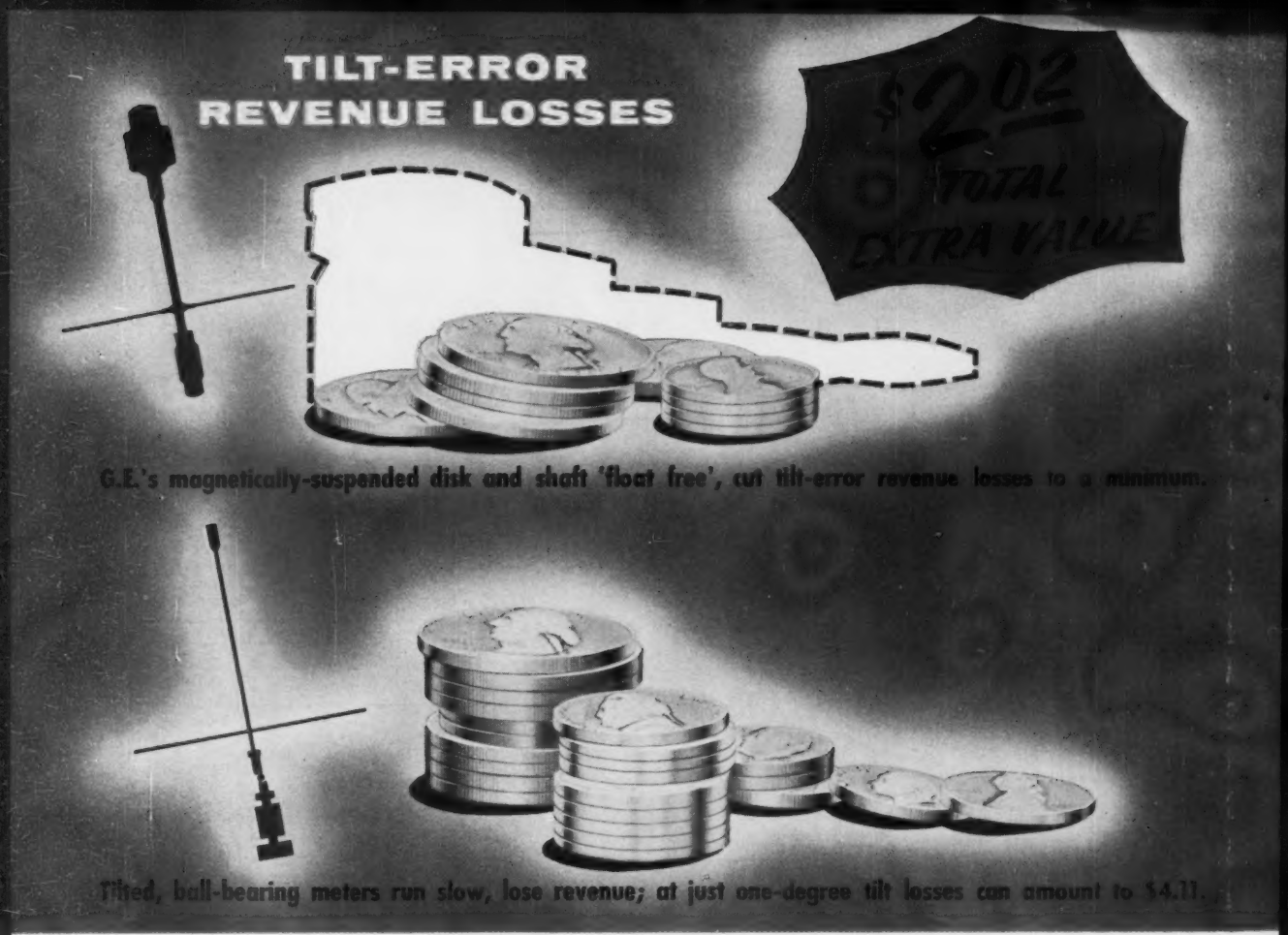
Continuous lubrication of the main shafts in the turbo-generators is assured by auxiliary pumps shown in the photo below. The power for this equipment is assured by an ASCO Automatic Transfer Switch.

Inspector checks the oil level in the auxiliary lubricant pump for the generators.

ASCO®

ASCO Electromagnetic Control

Automatic Switch Co. 50-P HANOVER ROAD: FLORHAM PARK, NEW JERSEY, FRONTIER 7-4600


TILT-ERROR
REVENUE LOSSES
$2.02
TOTAL
EXTRA VALUE
G.E.'s magnetically-suspended disk and shaft 'float free', cut tilt-error revenue losses to a minimum.
Tilted, ball-bearing meters run slow, lose revenue; at just one-degree tilt losses can amount to $4.11.

Today's purchase of each General Electric I-60 meter provides . . .

Up to $2.02 in EXTRA VALUE because

Each General Electric single-phase magnetic suspension meter put in service today can increase gross revenue up to $4.11 in just 30 years by greatly reducing tilt-error losses . . . here's proof:

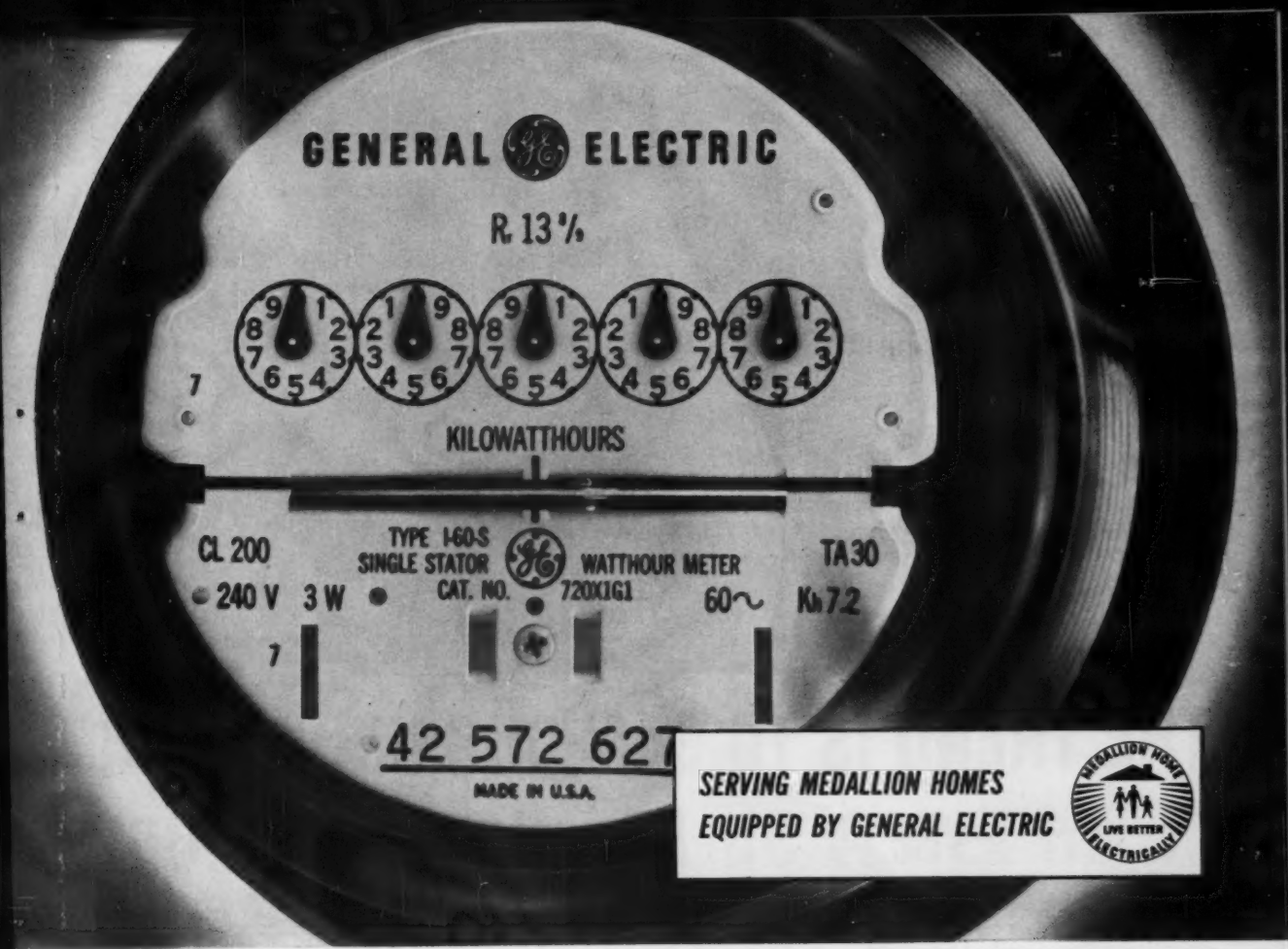
Old-style, ball-bearing meters lose revenue when operating in a tilted position. Just how much you lose depends on the degree and angle of tilt and meter load.

For example: a ball-bearing meter at just *one* degree forward tilt—operating at a continuous average of 240 volts, 3.0 amperes—in just one year would lose 5.7 kwhrs *more* than a General Electric I-60 meter mounted in the same position. In 30 years, this loss would amount to a sizeable 171 kwhrs. Using *Electrical World's* forecast for price per kwhr over the next 30 years, the gross revenue loss would be $4.11. Considering the 'present worth' factor at 6% interest for each of the 30 years, the *conservative* extra value realized today with each G-E I-60 meter would be $2.02, at only one degree forward tilt. Much higher savings are realized at tilt errors of 2 to 6 degrees (see chart).

How many tilted meters are on your line? Each of these meters represents a possible revenue loss of $4.11—or more—*unless* you have G-E magnetic suspension meters which offer greatest protection against substantial tilt-caused losses. By magnetically-suspending the disk and shaft in G-E meters, friction and disk displacement—major causes of tilt losses—are minimized.

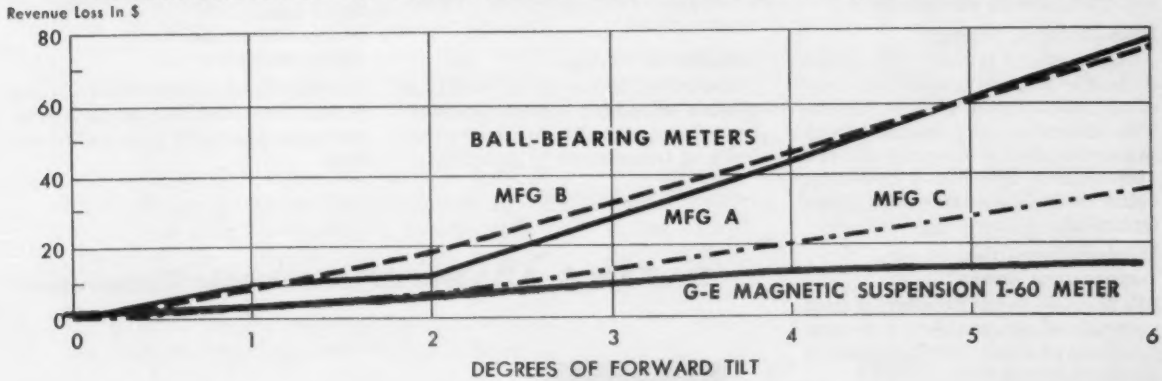
For the complete "extra value" story on General Electric meters, contact your G-E Apparatus Salesman, or write General Electric Co., Somersworth, New Hampshire. 713-02

In metering, anything less than the best is too costly



# of Reduced Tilt-error Revenue Losses

TILT-ERROR REVENUE LOSS IN 30 YEARS—Class 200, 3W, 240V, Single-stator Watthour Meters



METER DEPARTMENT

GENERAL ELECTRIC

In high voltage transformers, other heavy duty electrical and electronic equipment...

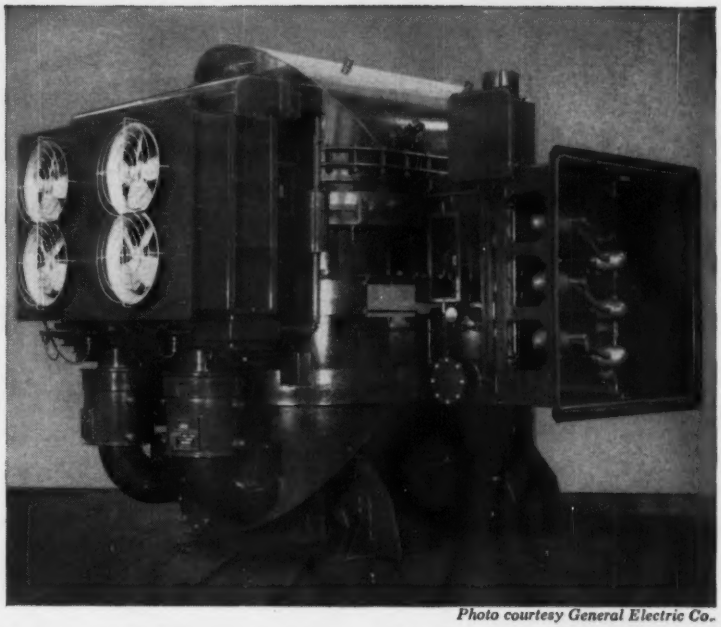


Photo courtesy General Electric Co.

THE TREND IS TO GASEOUS INSULATION WITH B&A® SULFUR HEXAFLUORIDE

The trend in requirements for high voltage equipment is toward higher operating voltages, units of minimum size and weight, greater safety and lower maintenance costs. For these reasons, sulfur hexafluoride is being used to insulate a wide variety of electrical and electronic equipment.

Sulfur hexafluoride is not only the preferred gaseous dielectric—it has also proved superior to liquid insulation in many applications. For example, the use of SF_6 instead of oil to insulate high voltage transformers has the following advantages:

High Dielectric Strength

At atmospheric pressure, SF_6 has a dielectric strength 2 to 3 times that of air, nitrogen or carbon dioxide. This favorable ratio increases with pressure so that in the range of 2 to 3 atmospheres SF_6 has a dielectric value roughly equivalent to transformer oil.

Efficient Over Wide Temperature Range*

SF_6 is stable in the presence of most materials of construction up to temperatures of about 150°C; remains a gas down to −63.8°C.

*Where extreme inertness to other materials is required or when service conditions involve temperatures in the range of 150°C to 250°C (or higher!), Baker & Adamson's Perfluoropropane (C_3F_8) is recommended.

Reduces Noise Level and Weight of Equipment

Both the noise level and weight of transformers can be reduced substantially by insulating with SF_6 rather than with a liquid. The low noise feature is particularly important where residences are nearby. Weight savings pay off for portable equipment and reduce installation costs for stationary equipment.

Safe to Use

SF_6 is non-toxic, chemically and physiologically inert, fire-proof and explosion-proof.

Installation Savings

Installation in fire-proof vaults is eliminated and bus runs can be shortened drastically due to closer proximity of transformer to generator.

Many of these advantages are also applicable to other commercial uses of sulfur hexafluoride, such as in:

Interrupter Switches
Radio and Microwave Frequency Power Transmission
X-Ray Equipment
Audio Equipment
Cathode Ray Accelerators
Van de Graaff Machines
Television Filterplexers
Radar Duplexers
Gap Tubes
Switch Gear
Wave Guides
Airborne Electronics
Silicon Rectifiers

Investigate all the advantages of B&A Sulfur Hexafluoride gaseous insulation *now*. Write for technical literature.

BAKER & ADAMSON® Electronic Chemicals

Allied Chemical

GENERAL CHEMICAL DIVISION
40 Rector Street, New York 6, N. Y.

You're never in doubt

From storeroom to pole top, an O-B distribution clamp is easy to identify by its bright orange tag. Fixed beneath the rivet head . . . removed with a tug . . . the tag clearly shows a clamp's catalog number, range of conductor sizes, and type . . . information that helps you pick the right clamp for the job.

Tagging an O-B Strateline, Cooline L-W or Universal clamp adds nothing to its cost . . . but does add to your convenience in handling every step of the way . . . filling stock requisitions, on the line-truck, and at the job site.

This simple tagging system puts all the information you need at your finger tips. Although clamping range in inches-diameter has been cast into the body of O-B clamps for many years, the tag supplements this by giving the range in terms of conductor size (AWG or MCM) of ACSR, all aluminum, and copper cables. Since the catalog number shows on the tag, confusion with the body casting number is also eliminated.

If you have ever had the wrong distribution clamps delivered at the job, you'll appreciate tagged clamps . . . and the tags identify quality products.

OHIO BRASS COMPANY, MANSFIELD, OHIO
Canadian Ohio Brass Co., Ltd., Niagara Falls, Ont.

Distributed by GraybaR ELECTRIC COMPANY

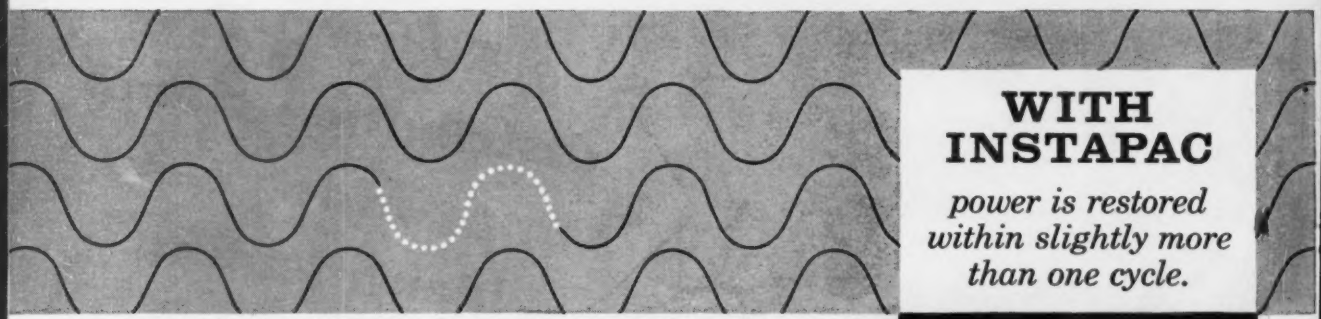
Ohio Brass HOLAN

PORCELAIN INSULATORS • LINE HARDWARE • CAPACITORS • LIGHTNING ARRESTERS
BUSHINGS • HOLAN TRUCK-MOUNTED POWER DEVICES AND BODIES • BRONZE VALVES

10041-H

Onan Instapac provides

your equipment won't know



WITH INSTAPAC

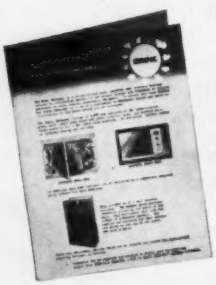
power is restored within slightly more than one cycle.

(Dotted line indicates power outage)

WITHOUT INSTAPAC

500 to 600 cycles can be lost before power is restored.

Write for free folder and specifications sheet



Complete data including diagrams showing three popular Instapac hook-ups: (1) Instapac combined with an Onan Standby Power Plant; (2) Instapac with no plant, using batteries for temporary standby power; (3) Instapac as a continuous power source for critical applications where not even the .020 seconds lapse in power can be permitted.

COMPACT SIZE. Wall Mounting: Cabinet (illustrated) 19″ wide, 30″ high, 8½″ deep. Rack Mounting: 19″ wide, 12¼″ high, 8½″ deep.

power so fast that the main power is off

Within 20 milliseconds of a power outage, Instapac supplies emergency power . . . combined with an Onan Electric Plant you have complete standby protection

The seconds it takes to start an engine-driven standby power plant and switch it into the circuit may be too long where continuous operation is essential.

In microwave and television relay stations . . . in marine, railroad and aircraft communications . . . in telemetering . . . etc. . . . a power lapse of only seconds can jumble signals, cause wrong instructions to be sent, cause loss of valuable time, even loss of irreplaceable messages.

If you have any of these situations you need immediate power—you need Instapac.

Instapac is a transistorized inverter which converts battery current to alternating current of the proper frequency and voltage. It is rated at 1 KVA (a booster is available to raise this to 1.35 KVA) . . . 120 volts, 60 cycle; 50 cycle units also available. Instapac may be wall mounted, as illustrated, or rack mounted, to meet your requirements.

Instapac is reliable. There are no moving parts in the inverter itself such as you'll find in a motor-coupled, engine-driven standby plant where there's always the risk the engine won't start fast enough.

Instapac is manufactured by Onan, the world's leading builder of electric power plants—the only electric plants that are Performance Certified to do the job you want done . . . most dependably . . . and at lowest cost.

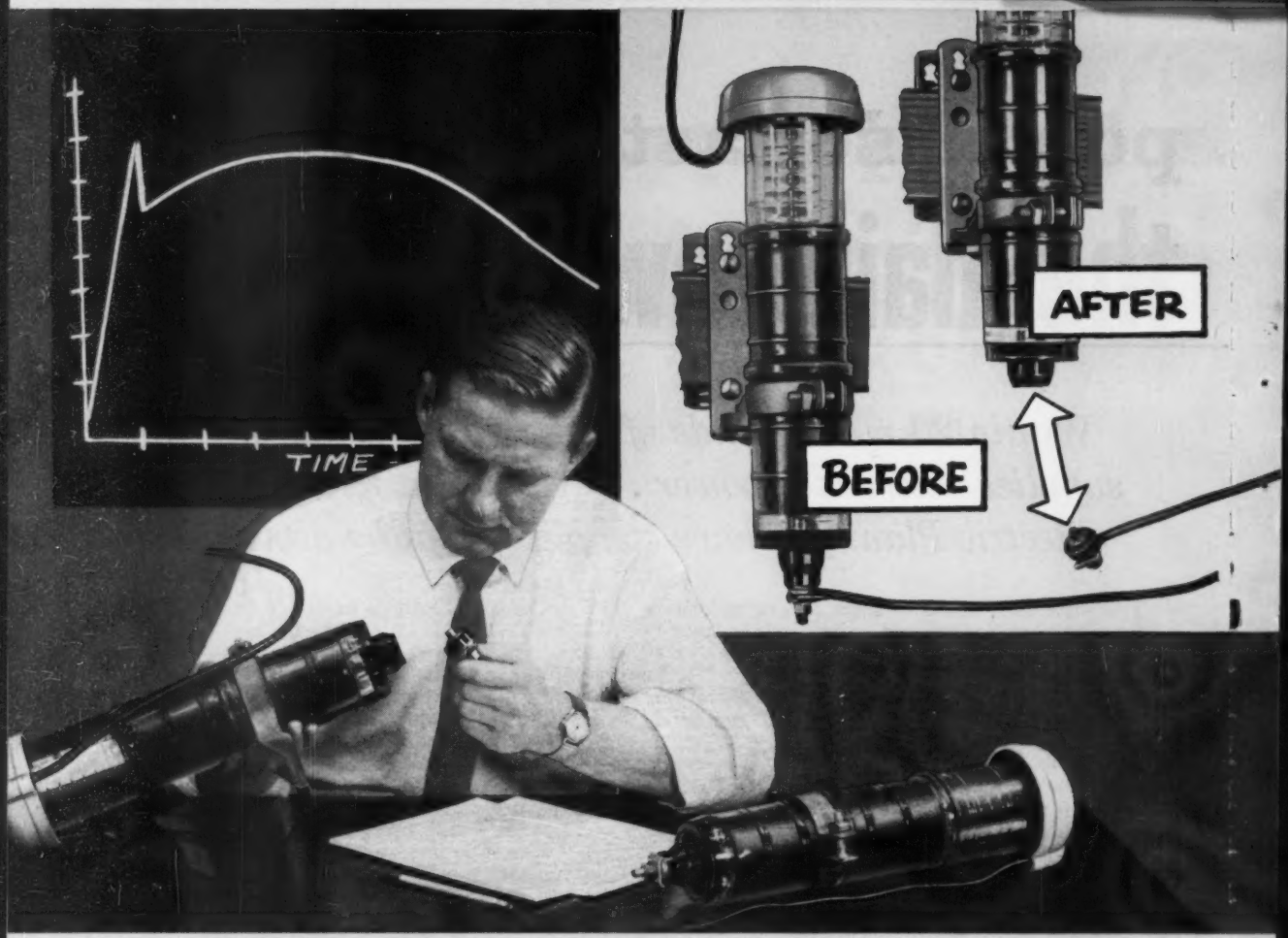
ONLY ONAN GIVES YOU THIS CERTIFICATION

PERFORMANCE CERTIFIED
We certify that when properly installed and operated this Onan electric plant will deliver the full power and the voltage and frequency regulation promised by its nameplate and published specifications. This plant has undergone several hours of running-in and testing under realistic load conditions, in accordance with procedures certified by an independent testing laboratory.
D. W. ONAN & SONS INC.
Minneapolis 14, Minnesota
Onan

Onan®

World's Leading Builder of Electric Power Plants

D. W. ONAN & SONS INC., 2608 UNIVERSITY AVE. S.E., MINNEAPOLIS 14, MINN.



Above: at left the L-M Type E-3 9kv arrester. At right, the same arrester after the Isolator has been made to operate by deliberately failing the arrester with a high overvoltage. The Isolator disconnects the ground instantly so that the back-up device does not lock out and permanently disconnect a whole section. And the disconnected ground lead is easily seen. Lightning Arrester Engineer F. Schultz examines the Isolator.

The "Isolator" On L-M Arresters Positively Prevents Line Lockout

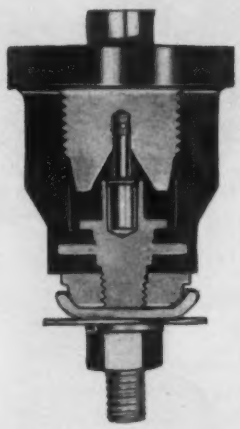
One utility company that has kept accurate records reports that in 167,410 L-M arrester-service years, over 12 years, there were only 59 Isolator operations in service. This is a truly remarkable record. Probably only L-M Valve arresters could have established such a low failure rate—three-hundredths of one percent!

Those 59 Isolator operations indicated arrester failure from whatever cause—direct strokes, overvoltage, or other causes. Without the Isolator, the feeder could have been grounded, and the back-up protective device locked out. Crews would have been out, trying to find the faulty arrester—not an easy task—and a costly one.

The L-M-Isolator instantly cut off the ground; and the disconnected ground lead could be easily seen by a line crew.

The Isolator was originated by L-M. It has been in service more than 20 years. The Isolator has definite time-current characteristics, so that a definite amount of heat from follow current is required to operate the Isolator. It operates any time that the arrester fails, or is about to fail.

The Isolator is only one of many superior features of L-M Valve Type arresters. Ask the L-M Field Engineer for details, and a copy of L-M's paper, "Lightning Arrester Application". Or write Line Material Industries, Milwaukee 1, Wisconsin. In Canada: CLM Industries, McGraw-Edison (Canada) Limited, Toronto 13, Canada.



Cutaway view of L-M's insurance device, the Isolator. Should a shorted gap or clinkered element permit follow current to continue to flow, the heat operates the Isolator instantly, before the back-up device can lock out. The time is controlled by the time-current characteristics of the Isolator. This prevents a faulty arrester from grounding feeders, cuts hunting time and service outages.

LM® **LINE MATERIAL® Industries**
McGRAW-EDISON COMPANY
458
Lightning Arresters
McGRAW EDISON

DISTRIBUTION TRANSFORMERS • RECLOSERS AND OIL SWITCHES • FUSE CUTOUTS AND FUSE LINKS • LIGHTNING ARRESTERS • POWER SWITCHING EQUIPMENT
PACKAGED SUBSTATIONS • CAPACITORS • REGULATORS • OUTDOOR LIGHTING • LINE CONSTRUCTION MATERIALS • PORCELAIN INSULATORS • FIBRE PIPE & CONDUIT

The Convention and a New Posture for EEI

Edison Electric Institute annual meetings frequently produce more action behind the scenes than on-stage. EEI has not been noted for bringing really vital industry problems in all their pristine detail squarely before the convention microphones. But the convention just closed revealed a different pattern.

The Atlantic City EEI meeting (p 93) saw enough significant problems attacked frankly in open forum to keep fertile minds and voices busy for quite awhile. What did we get?

• **A much stronger EEI research program** is being considered actively. Requiring new organizational structure and financing methods, it would serve the utility industry without competing with individual company or manufacturer research.

• **The approach to company—co-op relations** came under strong recommendation that the time is here for more active cooperation toward the goal of bringing the co-ops into a more active role in the business community.

• **The interconnection and operating pool record** of the investor-owned utilities is a dramatic one of many mergers and acquisitions, followed now by growing inter-company pools and operating agreements. It should be presented dramatically.

• **The production unit ordering pattern** may now be capable of smoothing action under joint effort by utilities and manufacturers, as the pooling arrangements make huge, economical units possible.

• **The Live Better Electrically promotion** for two years may not have been punching the right motivation buttons. A new approach is being mapped.

• **Urban redevelopment** is one of the really big unexploited areas open to utility participation. Those not yet involved are missing a big bet.

Still on the program were the usual ineffective exhortations pro private enterprise, con socialism. They aroused about as much interest as usual: ie, not much.

But do we discern a new spirit, a fresh approach by the EEI? We think we do. What's behind it?

It's evident the Institute is maturing from an information-agency to a bona fide leadership group. Perhaps it's significant that the speakers presenting these subjects, and stating what must be taken as EEI position, are the "younger," vibrant, enthusiastic members of management. At least, they are the young in heart.

We've long believed that the single greatest attribute missing from utility leadership was "heart." Maybe the missing ingredient is being added.

Court's Enrico Fermi Decision

The Atomic Energy Commission says it will appeal the decision to the US Supreme Court. Edison continues work

The US Court of Appeals last week blew the whistle on construction at Power Reactor Development Co's Enrico Fermi nuclear power plant at Monroe, Mich.

At issue was a technical point—raised by several labor unions—that the Atomic Energy Commission should not be allowed to issue a construction permit for a new nuclear plant until all safety problems have been solved—until AEC certifies the reactor is safe to operate. The court ruled (in a 2-1 verdict) that a construction permit is tantamount to a license to operate, and therefore, all safety questions should be resolved before the construction permit is authorized.

Meanwhile, the UAW says "The decision is a victory of those of us in this heavily populated area who have a deep respect for the power of the atom."

AEC and the PRDC argued unsuccessfully that:

(1) A construction permit merely allows the applicant to build his plant, under AEC-approved plans, while an additional license to operate the plant is still necessary—and that this second license could be withheld until safety issues have been worked out;

(2) The construction go-ahead would give the applicant several years lead-time to get his plant into operation—assuming AEC would give him a go-ahead on safety factors when the reactor is ready for operation.

The court decision also casts a shadow across other private nuclear plant construction totaling more than $350-million, and involving an estimated 900,000 kw of power. Federal projects are not subject to the AEC licensing provisions, and therefore, not subject to this court decision.

The private projects, in varying stages of development, include: Commonwealth Edison's Dresden plant, Yankee Atomic Electric's plant; Consolidated Edison's Indian Point plant; Northern States Power's Pathfinder plant; Carolinas-Virginia Nuclear Power Associates' plant; Pacific Gas & Electric's Humboldt Bay plant; Consumers Power's Big Rock Point plant; Philadelphia Electric's Peach Bottom plant.

The three labor unions who successfully appealed against Detroit Edison are the United Auto Workers, International Union of Electrical Workers (IUE) and the United Paperworkers. They argued that, "Under present technological conditions, the (Fermi) reactor would be inherently unsafe," and could "create a hazard . . . or an explosion, or other incident." They also contended that granting of the AEC construction license before safety factors have been proved is a violation of the Atomic Energy Act. They added that there are "reasonable grounds for belief that a license to operate (the Fermi reactor) when it is completed, with an expenditure of $45-million will be issued without proper consideration of and regard for the health and safety of the public." Also, "The fear of a possible atomic catastrophe, in itself, before any operation would begin, would, among other things, have the effect of depressing values of property owned by the petitioners (unions), and would cause plants in which they work under collective bargaining agreements to move and thereby cause a loss of employment."

Majority Questions Operation

The court majority—Judges Edgerton and Bazelon—ruled that construction itself would not injure, in any way, the unions or their members. But the court did accept the union theory that the AEC construction license probably would lead directly to an operating license: "It is plainly probable, in a high degree, that if the construction permit stands, Power Reactor Development Co will get an operating license, and will operate. We think petitioners (unions) are therefore aggrieved by the issuance of the (construction) permit."

The court interpreted the Atomic Energy Act as requiring approval of safety factors in the proposed

The Law and How the Court Interpreted It

Here is the key section 185 of the Atomic Energy Act:

"All applicants for licenses to construct or modify production or utilization facilities shall, if the application is otherwise acceptable to the Commission, be initially granted a construction permit . . . upon the completion of the construction or modification of the facility, upon the filing of any additional information needed to bring the original application up to date, and upon finding that the facility authorized has been constructed and will operate in conformity with the application as amended and in conformity with the provisions of this chapter and of the rules and regulations of the Commission, and in the absence of any good cause being shown to the Commission why the granting of a license would not be in accordance with the provisions of this Act, the Commission shall thereupon issue a license to the applicant. For all other purposes of this Act a construction permit is deemed to be a 'license'."

Here is how the majority construed this key section:

"It seems certain that if the Act did not require, as a condition to the issuance of a construction permit, a finding that the proposed facility can be operated without undue risk to the health and safety of the public, the Act would not require the issuance of a license when the permitted construction is carried out.

"At the very least it is doubtful whether the Commission's construction of the Atomic Energy Act is correct. The possibilities of harm are so enormous that any doubt as to what findings the Act requires, and any doubt as to whether the Commission made such findings, should be resolved on the side of safety."

Could Affect Other Projects

nuclear reactor plant before a construction license is issued. It cited testimony in Congress, at the time the Act was passsed, to back up its theory that all safety factors are to be resolved at the time of the construction license—and an operating license would follow later, almost automatically.

"It seems certain," the court majority continued, "that if the Act did not require, as a condition to the issuance of a construction permit, a finding that the proposed facility can be operated without undue risk to the health and safety of the public, the act would not require the issuance of a license when the permitted construction is carried out. At the very least, it is doubtful whether the (Atomic Energy) Commission's construction of the Atomic Energy Act is correct. The possibilities of harm are so enormous that any doubt as to what the findings the Act requires, and any doubt as to whether the Commission made such findings, should be resolved on the side of safety."

Dissent on Provisional Step

Judge Burger, third member of the appellate court, dissented from the majority on the issue of whether a construction permit is a final, or only a provisional step. "The Commission has issued only a provisional permit to build a plant, not to operate it," he said.

"The sole basis of challenge to the provisional construction permit is that the future possibility that an operating permit will be unlawfully and improperly issued by the Commission creates a 'present', 'immediate,' and 'unavoidable threat' or injury. I do not think we have any occasion to consider what is not now before us."

Burger cited the AEC construction order for PRDC: "There is reasonable assurance that theoretical and experimental programs under way will develop sufficient data to justify the issuance of an operating license, and that the results of these programs will be available prior to the time it is necessary for the Commission to rule on the operating aspect of the PRDC license application."

Burger attacked the majority statement that the US economy "cannot afford to invest enormous sums in the construction of an atomic reactor that will not be operated." "Our entire history is to the contrary," he said. "We invested not mere millions, but billions in the original development of nuclear fission on a totally unproven theory of physics . . . if we were dealing with a radio or TV license or some other purely commercial enterprise in a developed and mature industry, I would agree that there is a risk that a large investment in machines might conceivably exert a subtle influence on the ultimate grant of an operations permit . . . but I cannot join in the suggestion that members of the Atomic Energy Commission, who have assumed obligations under oaths as binding as ours, would permit an operation dangerous to the public because $40- or $50-million dollars is invested in brick, mortar and steel by men who knew from the outset that they were engaged in a scientific gamble."

The AEC has announced that it will appeal the decision to the US Supreme Court. The decision was made after AEC Chairman John McCone and others from AEC met with Attorney General William Rogers and members of the Justice Department.

Edison Continues Generator Work

A spokesman for Detroit Edison said "The company feels confident that the construction permit for Enrico Fermi will be reaffirmed and that an operating permit will be granted." DECO is continuing its phase of the construction on schedule during the 15-day period before the Appellate Court's order becomes effective. The generator is nearing completion on the site with both stator and rotor in place.

Coastal Tie Line Proposed

Two 500-kv transmission lines between Bonneville Power Administration and California were proposed last week by H. Zinder & Associates in a special study for Gov Edmund Brown of California. The report was released by California officials in a hearing before the Senate Interior Committee.

Immediate effect of the huge intertie proposal was to kill off any action this year by the Committee on a proposed contract between Bonneville and Pacific Gas & Electric Co for a smaller, single 230-kv circuit, connecting their two systems via California-Oregon Power Co.

Zinder's recommendation calls for two 550-kv circuits—one from The Dalles Dam and one from John Day Dam—between the Bonneville system and Bakersfield, Calif. New 500/230-kv substations would be built near Redmond and Klamath Falls, Ore., Shasta, San Francisco and Fresno, Calif.

Cost of the mammoth line would be about $200-million. Zinder estimates it would cost the federal government about $12-million yearly on a 10-year payout period; private utilities would have to pay about $28-million a year. This investment would be in addition to net amortization benefits paid for by the line's operation.

In contrast, the smaller 230-kv line proposed by PG&E would cost about $4-million.

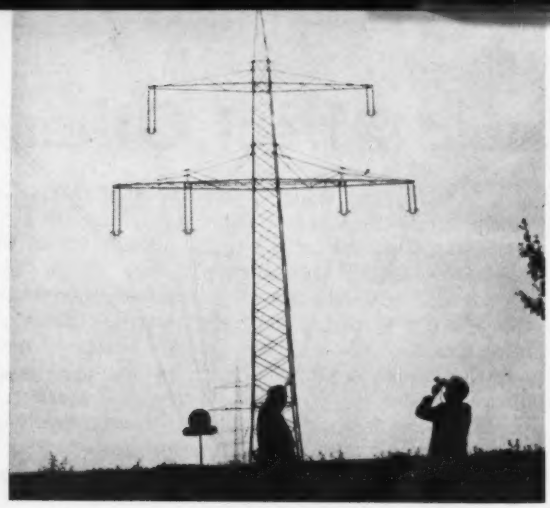
The proposed 500-kv circuits would have a 2-million kw peaking capacity, a 1.6-million kw firm capacity. Zinder says the firm power sales over the proposed intertie would be what makes it economically feasible. However, to provide this feasibility, Zinder makes two recommendations:

(1) A 300,000-kw steam plant would be built—probably by a public utility district—in Washington, near existing coal fields. This firm power would be sold outside the Bonneville area, over the intertie, to California customers.

(2) Bonneville power from the intertie would be sold into southern California, and would permit backing off of gas, fuel oil and lower Colorado hydro power plants.

DAN BRAYMER IN EUROPE—II

Dutch Test Tapes, Oil for Insulation; 380 Kv for German Coal-Area Lines



Arnhem, Holland — Impulse breakdown strengths on high polymer tapes and oils found in tests at Kema Laboratories here are double those obtainable on the oil-paper combinations used as insulation in high voltage and EHV cables.

At Kema, Drs de Vos and Vermeer tested samples of cable made of polycarbonate tapes with thin cable oil and of polystyrene with liquid paraffin. The tests discovered not only high impulse strength, but also improved ionization-starting stresses. Their findings intimate that impregnated plastic dielectrics will have an important place in future EHV cables.

Thanks to the work of Dr J. J. Went, chief physicist at Kema, on a little-explored homogeneous suspension reactor concept, Holland is assured a seat at the international nuclear research table. Went and his associates built a zero-energy reactor for studying the design problems in development of a thermo-converter power reactor with a high conversion ratio—0.95 to 1.0—using a homogeneous slurry of uranium and thorium.

On the basis of their tests, Went and his associates are building at Kema a 250-tkw test reactor to be known as the KSTR (Kema Suspension Test Reactor). It could be the forerunner of a Dutch A-plant.

Netherlands utilities are not enthusiastic about purchasing a turnkey 150-Mw nuclear power plant under the Euratom program. The thrifty Dutch see little merit in a project whose production costs will not at least approximate those of their conventional plants. They see far more sense in building a smaller plant for their present power system than in committing themselves to a rigid program involving a plant of a size that ill fits their needs, especially when such a plant would be built abroad.

Increasing acceptance by utilities abroad, including some in the US, of Kema-authenticated test certificates on power apparatus is bringing more and more American and British developmental switchgear to be tested in the Kema short-circuit laboratory, one of the largest. Built to test power apparatus for the electric supply and other Netherlands industries, fully a third of Kema's $1.3-million annual revenue comes from testing for foreign firms.

Germans Build Coal-Power Links

Essen, Germany—Here in the heart of the Ruhr there is a heavy surplus of hard coal. Rather than store it, German coal mine owners are building major generating stations to burn this surplus, produce energy, and feed that energy into the mammoth Rheinisch-Westfaelisches-Elektrizitaetswerk (RWE) West German power system. There, stations aggregating 800 Mw are in operation.

Today, after an arduous negotiation, a contractual agreement has been hammered out between RWE and the mine owners for supplying hard-coal-generated energy at a rate attractive to RWE as a supplement to production from its own base-load plants in the Cologne area burning brown coal.

To integrate better the base-load, brown-coal generation in the Cologne area into the hard-coal generation in the Ruhr, RWE plans to build 380-kv transmission linking Cologne with Wanne-Eickel to Wessel, from which point a 380-kv interconnection may be extended into the Netherlands by 1965.

The two 380-kv lines have been authorized and will be built in the next three years. For the present interchange, however, the three double-circuit 220-kv lines that tie the soft-coal region of Cologne with the hard-coal Ruhr region are adequate. But it will be necessary eventually to divide the 220-kv network into smaller loops to hold down breaker duties.

Recently RWE took bids from major West German cable makers for ⅝-mile of 380-kv high-pressure, oil-filled, vapor-insulated cable with a single core. At least one manufacturer proposed use of corrugated-aluminum-sheath cable for linking the large power station's main transformer bank with an adjacent 380-kv switchyard.

Dr Mandel, director of nuclear power activities for RWE, estimates that the 15-Mw, closed-cycle, boiling-water power reactor plant at Kahl will be carrying load by the end of 1960. The Kahl plant, near Frankfort, will be the first nuclear power plant in West Germany.

At the moment RWE is studying the purchase of a 200 to 300—Mw nuclear plant for use in conjunction with a pumped storage hydro plant in South Germany. Bids have been invited from German affiliates of French, English, and US manufacturers. Proposals are expected this summer, but the decision to build will depend on whether energy costs will be competitive with energy produced by conventional plants.

Ellis and Person Debate Policy

Advisory group inadvertently sets the scene for a public-private power argument while gleaning facts for platform

Clyde Ellis, general manager of the National Rural Electric Cooperative Assn, used a meeting of the Democratic Advisory Council on Natural Resources in Denver as an opportunity for deriding the investor-owned electric utility industry.

At the invitation of Paul Butler, Democratic national chairman, Edison Electric Institute presented its views on a national water and power policy, using as spokesman Robert T. Person, president of Public Service Co of Colorado (EW, June 13, p 43). After presentation of the policy suggestions (full text on p 86), Ellis said Person's "all out attack" had "forced" him to make a rebuttal.

Says Statements Not Aimed at REA

Commented Person later: "He interpreted some things in the statement as being anti-REA, and this was not the case at all."

One of Ellis' remarks was that private power companies cannot be relied on for comprehensive development of rivers. "Power companies would develop only the most valuable sites, and half develop even those they tackled," he said. In fact, the EEI policy statement does not refer to development of the sites by utilities at all, but by non-federal capital which might be irrigation or land development companies or agencies as well as local privately or publically-owned utilities.

Ellis Revives 'Subsidy' Charge

As the unscheduled debate continued, Ellis challenged the EEI contention that government-financed power projects should pay taxes equal to those paid by private utilities. He said power companies like to "make a big to-do about taxes," but they get most of their taxes back in subsidies. "Utilities have been forgiven $23- to $25-billion of federal tax liability by way of accelerated depreciation allowances," he added. Person immediately replied that accelerated depreciation was in no sense "foregiveness" of taxes, and that the law applies to all businesses—even farming—and not just to the utility industry. In a conversation with *Electrical World* later, Person wryly commented: "It seems strange to me that an outfit that pays no taxes should be critical of those that do."

Equal Money Rate Recommended

The EEI statement says:

"Where the federal government engages in generating electric power the enterprise should pay the going rate for money. The taxpayer should receive at least the market price of money—that is the price the American people want for the use of their money when it is used in the power business."

Although there was no reference to REA financing in the statement, Ellis used it as an opportunity to say that rural electrification was a "social decision" of Congress, not an economic one. And he repeated charges that co-ops are excluded from towns over 1,500 population, and Congress "did not provide rural electrics with a dependable power source." He apparently referred to the law preventing the government from loaning co-ops money to serve towns over 1,500 population, which does not necessarily exclude them from providing service.

Ellis said co-ops must buy half of their power needs from private utilities, who imposed "penalties" on them when the rural systems went after larger loads in their service areas.

"On the average," said Ellis, "our members (NRECA) are able to purchase from the federal government 60% more wholesale energy per dollar spent than they are from investor-owned utility companies." He added that federal systems also help keep down the cost of private power. He referred to a recent NRECA study that showed that retail power rates in 10 cities in federal power areas were 40% below retail private power rates in 10 other cities remote from federal power. A third group of 10 cities, "near" federal power, had retail rates about half way between the other two groups. "The evidence is clear," Ellis charged. "Federal power is a competitive regulatory force essential to the protection of the public."

Company Accused of Raiding

Ellis brought the debate close to personal infighting when he accused Person's company of "raiding" the territory of Union Rural Electric Assn which operates just north of Denver. Person replied that the Colorado Supreme Court had permitted the action, and "as long as it's legal, I don't see anything wrong with it."

ELLIS

PERSON

Electric Utility Industry States

As water resources and power planks are being written by the major political parties, the investor-owned electric utilities are taking an interest.

First major collective effort to present the utility story to those with influence in writing the planks was by Edison Electric Institute at the invitation of Paul Butler, Democratic national chairman. Robert T. Person, president of Public Service Co of Colorado, acted as spokesman before the Democratic Advisory Committee on Natural Resources.

For the information and use of the nation's utility industry, here is the text of Person's talk.

■ As we move ahead into the second half of this century, we can look for a rapidly increasing economic activity. There will be a continuing growth in population, in industrial development and in business expansion. In the coming years there will be even greater progress than we have seen in the past as a result of research and scientific development.

Long-Range Planning of Resources Needed

The future holds great promise, but for us to realize its full potential depends to a great measure on what we do today. Wise long-range planning by industry and government in the use of our natural resources is essential, even more today than in the past.

As our population and economic development expands, society becomes more complex and it becomes even more important to maintain a balance between those services which the individual can supply to himself through his own energy and initiative, and those which he must provide in conjunction with his fellow citizens through his government.

The electric power industry has a deep interest in the utilization of natural resources for the production of energy. America's natural resources should be developed in such a manner as to continue to provide our nation with an ample supply of electric power and this development should be done in the manner which best tends to keep America strong.

Water is one of our country's most precious natural resources and is of vital concern to every community. A significant area of our industry's resource policy is its position relative to water resource development and utilization. We support economically sound conservation, development and utilization of water resources.

The government has an interest in such matters as flood prevention, water supply, and reclamation. Often in connection with these functions the development of incidental electric power is economically feasible. In such cases development should be made.

However, we believe that much of the river basin development can be accomplished by non-federal capital. We believe that the federal government should encourage the use of voluntary investors' capital in river development.

We believe that certain river basin development can be carried on through coordination between federal and voluntary capital.

All federal water resource projects should be economically justifiable and construction estimates should be realistic and complete. Benefits should have substance and should take into account offsetting detriments.

In order to be economically feasible, the sum of all the benefits should exceed the sum of all the costs and detriments.

In the case of all river development projects, all of the purposes of a legislative act should be clearly defined in the legislation—flood control, navigation, irrigation, conservation or power.

The legislation should also indicate which are primary purposes and which are incidental purposes. In all cases, electric power should be secondary or incidental to one of the primary functions.

We believe that wherever feasible, the development of power at federal dams should be by non-federal licensees under the Federal Power Act, with adequate annual payments to the government for the use of water and federal property involved. Wherever feasible, this principle should be extended to include non-federal construction of dams and reservoirs, with licensing under the Act, wherever streams are truly navigable in interstate commerce or substantial amounts of public lands are involved.

The existence of Congressional authorization of a project should not rule out non-federal construction. Where Congress has approved a general plan for the comprehensive development of the water resources of a stream or basin, or where it has authorized the construction of a given project, the power companies, municipalities, districts and other local agencies should not be shut out from the development of such plan or project, or any part of it, or from constructing, owning or operating such projects or facilities.

Where there is such non-federal development, any expenditures made by the federal government for power development should be paid back to the federal government.

For the maximum public benefit, the government power generated at river development projects should be interconnected and coordinated with the existing power supply in the area.

Fair Marketing of Government Power Urged

When the government markets electric power, it should do so in a manner that is fair to all its citizens. About 80% of all Americans get their power from a power company; the preference clause prevents these people from receiving equal treatment with the remaining 20%. Serious thought should be given to the advisability of continuing a discrimination against 80% of the American people in favor of the remaining 20%. It is a matter of fairness; the kind of supplier who happens to serve a particular customer should not be decisive as to whether that customer is entitled to receive government generated power.

Where the federal government engages in generating electric power the enterprise should pay the going rate for money. The taxpayer should receive at least

Policy on Natural Resources

the market price of money—that is at least the price that the American people want for the use of their money when it is used in the power business.

In the same vein, government financed power projects should pay taxes equivalent to those paid by electric companies. The reason for this is that the money to pay these taxes comes from electric power customers because taxes are a business expense and, like all other expenses, are covered by the rate. Thus, 80% of the nation's electric power customers must pay federal income taxes on their electricity while the remaining 20% do not. Requiring government power projects to pay equivalent taxes would reduce discrimination against four-fifths of the nation's people.

Our industry recognizes that in the development of the nation's water resources the federal government has certain responsibilities, such as, flood control and reclamation. Where dams are constructed for these purposes the development of electric power is sometimes economically feasible. The companies recognize their responsibility to cooperate in such projects for the maximum benefit to the public, through installing generating capacity, by providing the means of bringing power from the point of generation to the point of use or by a combination of both.

Investor-Owned Systems are Available

For years the nation's electric companies have engaged in interconnection and pooling their facilities to obtain the greatest efficiency. This has required the construction of transmission lines to interconnect load centers and the generating plants that serve them. The resultant transmission network has been constructed on a sound, practical basis—it goes where people are, taking into account the local economics of each area.

America's electric companies have met the nation's demands for electric power by planning ahead. The companies have used foresight in planning both the capacity and the location of their transmission lines so that those lines will be of the maximum future value to the over-all power supply.

The energy demands of our civilization necessitate a never-ending search for new resources to supply these needs. The nation's electric utility companies are actively engaged in a broad and diversified industry program for the development of economically competitive nuclear power.

The Edison Electric Institute concurs in a nuclear power policy with objectives which (a) reduce the cost of nuclear power to competitive levels in high fuel cost areas of this country within this decade, (b) assist friendly nations to do likewise somewhat sooner, (c) and maintain US world leadership in the peaceful applications of nuclear energy.

For this reason the electric utility industry is devoting substantial resources of manpower, experience, organization and financial support to the successful attainment of these objectives.

As a result of government and industry each assuming their proper roles, nuclear energy has been developed in a practical way with little lost motion. America today is the acknowledged world leader in atomic power, and there is no indication at present of any potential challenge to this leadership. The present approach calls into play the most effective resources of both government and industry, with the result that atomic power is becoming part of American industry on a sound economic footing.

The wise use of natural resources is closely associated with the electric utility industry. The industry stands ready and able to meet in full the future power needs of this country as it has in the past. The industry cannot wait for the market for power to develop and then proceed to build to meet the market, but must plan far ahead so that the public can be assured of always having available an abundant supply of electric power.

The electric light and power companies constitute one of America's most important industries. The companies represent a total electric investment of $43 billion and have a total generating capability of more than 127 million kw. Last year the companies' output was 569 billion kwhr of electricity. The nation's some 400 electric light and power companies represent about 80% of the total electric utility industry. Historically the industry has doubled in size about every ten years as America has put electric power to work.

We have met our responsibilities in full. We confidently expect to do so in the years ahead. Every utility keeps up-to-date forecasts of the power needs of its area and has formulated plans to supply its future power requirements.

America's electric power companies recently announced their plans for meeting the nation's power requirements in 1970 and 1980. These plans are outlined in detail in separate exhibits of which copies are available. Briefly these plans call for sustained construction expenditures by the companies which will be on the order of $12 billion per year in 1980, compared to $3½ billion in 1960. The capability of the electric companies will be increased to more than 492 million kw by that year, nearly four times today's total.

America's electric power companies have done a creditable job in supplying this nation with electric power. They have in the past fulfilled their utility responsibilities in times of peace and in war, in a manner which has occasioned praise from America's highest military leaders. These companies, which are the backbone of one of our nation's basic industries, have formulated serious and feasible plans for continuing to meet this utility responsibility in the future.

America's electric power industry under government regulation stands ready to undertake either on its own or in cooperation with other agencies any project for the economical production of electric power that will advance the position of America or the well-being of its people. This industry offers a source of help and cooperation which sound and prudent government should not overlook.

Edison Electric Institute believes that the principles here stated will help substantially in maintaining America's leadership in the field of electric power.

Five Expanded ACSR Conductors

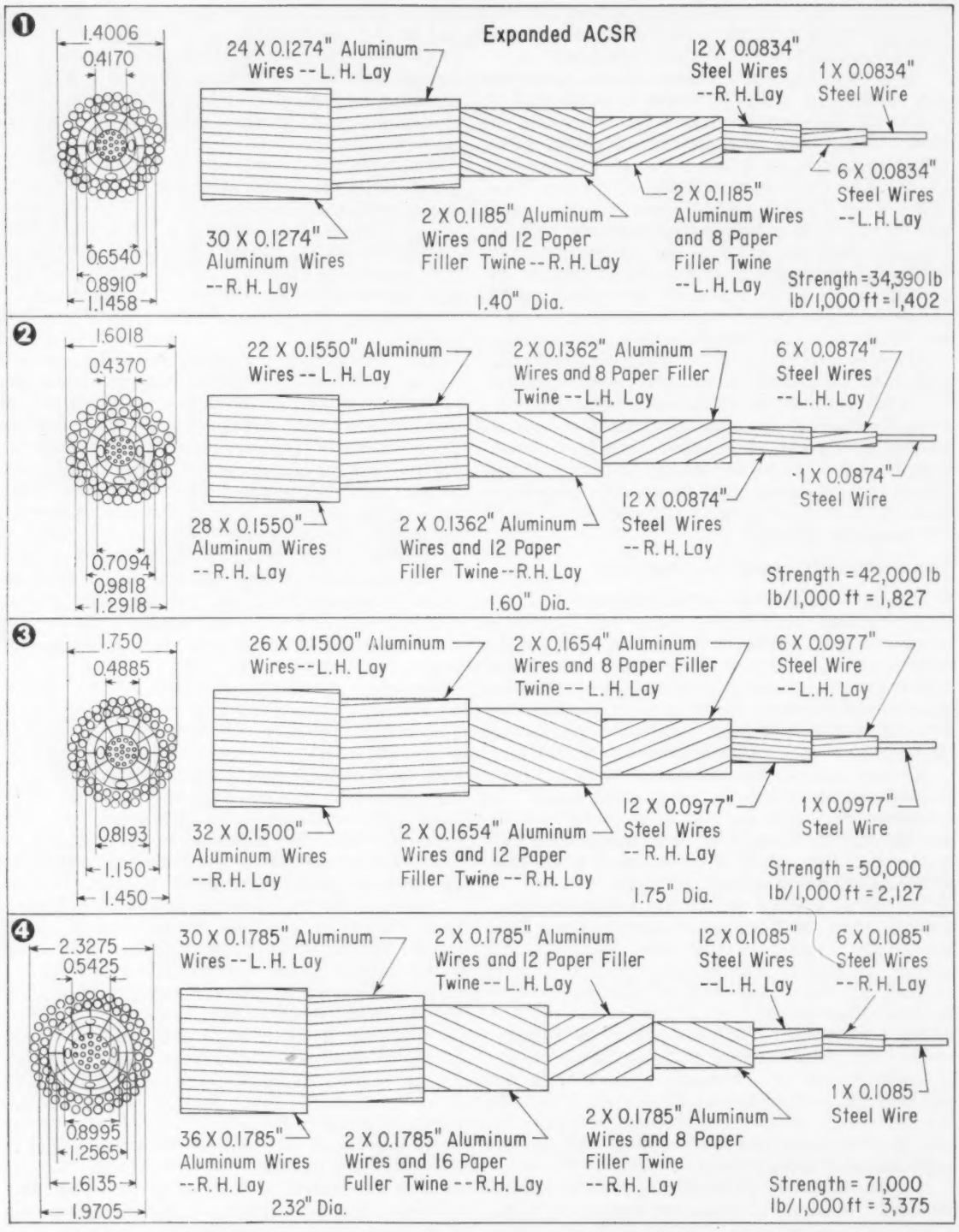

Expanded ACSR
1
1.4006
0.4170
0.6540
0.8910
1.1458
24 X 0.1274" Aluminum Wires -- L. H. Lay
12 X 0.0834" Steel Wires -- R. H. Lay
1 X 0.0834" Steel Wire
6 X 0.0834" Steel Wires -- L. H. Lay
2 X 0.1185" Aluminum Wires and 8 Paper Filler Twine -- L. H. Lay
2 X 0.1185" Aluminum Wires and 12 Paper Filler Twine -- R. H. Lay
30 X 0.1274" Aluminum Wires -- R. H. Lay
1.40" Dia.
Strength = 34,390 lb
lb/1,000 ft = 1,402
2
1.6018
0.4370
0.7094
0.9818
1.2918
22 X 0.1550" Aluminum Wires -- L. H. Lay
2 X 0.1362" Aluminum Wires and 8 Paper Filler Twine -- L.H. Lay
6 X 0.0874" Steel Wires -- L.H. Lay
1 X 0.0874" Steel Wire
12 X 0.0874" Steel Wires -- R. H. Lay
28 X 0.1550" Aluminum Wires -- R. H. Lay
2 X 0.1362" Aluminum Wires and 12 Paper Filler Twine -- R.H. Lay
1.60" Dia.
Strength = 42,000 lb
lb/1,000 ft = 1,827
3
1.750
0.4885
0.8193
1.150
1.450
26 X 0.1500" Aluminum Wires -- L.H. Lay
2 X 0.1654" Aluminum Wires and 8 Paper Filler Twine -- L. H. Lay
6 X 0.0977" Steel Wire -- L.H. Lay
12 X 0.0977" Steel Wires -- R. H. Lay
1 X 0.0977" Steel Wire
32 X 0.1500" Aluminum Wires -- R.H. Lay
2 X 0.1654" Aluminum Wires and 12 Paper Filler Twine -- R.H. Lay
1.75" Dia.
Strength = 50,000
lb/1,000 ft = 2,127
4
2.3275
0.5425
0.8995
1.2565
1.6135
1.9705
30 X 0.1785" Aluminum Wires -- L. H. Lay
2 X 0.1785" Aluminum Wires and 12 Paper Filler Twine -- L. H. Lay
12 X 0.1085" Steel Wires -- L. H. Lay
6 X 0.1085" Steel Wires -- R. H. Lay
1 X 0.1085 Steel Wire
2 X 0.1785" Aluminum Wires and 8 Paper Filler Twine -- R. H. Lay
36 X 0.1785" Aluminum Wires -- R. H. Lay
2 X 0.1785" Aluminum Wires and 16 Paper Fuller Twine -- R.H. Lay
2.32" Dia.
Strength = 71,000
lb/1,000 ft = 3,375

FIG 1—FOUR ACSR CONDUCTORS to be tested on Penelec 460-kv transmission project vary in diameter but share in being 'standard' compared with a fifth conductor. Those containing paper have proved themselves in operation and were chosen on the basis of experience on lower-voltage line and in laboratory tests. The optimum conductor, it is believed, is bracketed by these conductor sizes. On next page is shown the fifth 'non-standard' conductor

Selected for 460-Kv Prototype Line

Penelec EHV project for energization this summer will test for suitable and economical future requirements

P. L. LUMNITZER, Superintendent of Transmission, Pennsylvania Electric Co, Johnstown, Pa.

N. K. BARR, Chief Engineer, Electric Conductor Division, Kaiser Aluminum & Chemical Sales, Inc., Newark, Ohio

R. E. LARSON, Staff Engineer, Rome Cable Division, Aluminum Co of America, Pittsburgh, Pa.

Five expanded-core ACSR conductors have been selected for Pennsylvania Electric Co's 460-kv prototype transmission line (EW Jan 18, 1960, p 47) which will be energized this summer. By means of this extra-high-voltage project, Penelec expects to obtain operating experience at 460-kv and to carry on extensive research, including tests on conductors, structures, and equipment to determine the types most suitable and economical for the company's future requirements.

The line joins Saxton and Claysburg, respectively in Blair and Bedford Counties, Pa., and traverses an area considered representative of that served by the utility in terrain and weather. For 13 miles, it parallels a 115-kv line, and arrangements have been made for it to carry the existing line's load to afford experience with the 460-kv line as a link in the Penelec system. The 115-kv line may become part of a 460-kv line, if the latter voltage proves feasible.

Four conductor diameters, selected on the basis of experience with lower-voltage lines and on laboratory tests, will be used in four sections of the line. The optimum conductor, it is believed, is bracketed by these sizes. Kaiser Aluminum & Chemical Corp and Aluminum Co of America will each supply half of the expanded ACSR in each of the four sizes and will cooperate with Penelec in studying erection problems and conductor performance. The project will require nearly 380,000 ft of aluminum conductor.

30 Designs Considered

Some 30 conductor designs were considered, and samples of several were fabricated in an effort to arrive at the best at the lowest cost. Chosen as the four "standard" conductors were the paper expanded ACSR types which have proved themselves over several years of service in lines operating at up to 345-kv.

Besides the four "standards," three spans of a new conductor design will be tried. This conductor has aluminum tubes as the expanding medium. In bundled construction, 4,480 ft of this conductor will be installed on the middle phase in spans of 550, 445, and 1,245 ft, totaling 2,240 ft from the Claysburg substation to the end of the third span, a dead-end structure.

A sample of this fifth construction was made to test the feasibility of production techniques, and a routine patent search was instituted. Every part of this "new" design had been covered by George C. Oxer in his patent issued Nov. 4, 1930.

Normal load will be 750 amp per phase; emergency load 1,500 amp. Excess capacity, of course, will be available in some sizes and designs. It is difficult to avoid exceeding the metal areas actually required to carry the load in designing satisfactory conductors of such large diameters. The large metal area, reducing I^2R losses, often makes the larger sizes more economical over the years. Often the excess capacity can be used economically as load increases.

Starting at the Claysburg substation, the conductors will be installed in the following order:

1. 1.75-in. dia two-conductor bundle, including three spans of tubular expanded conductor, 4.14 miles.

2. 1.60-in. dia two-conductor bundle, 3.17 miles.

3. 1.40-in. dia two-conductor bundle, 3.78 miles.

4. 2.32-in. dia single-conductor, 1.90 miles.

Information will be sought on the costs of stringing two-conductor

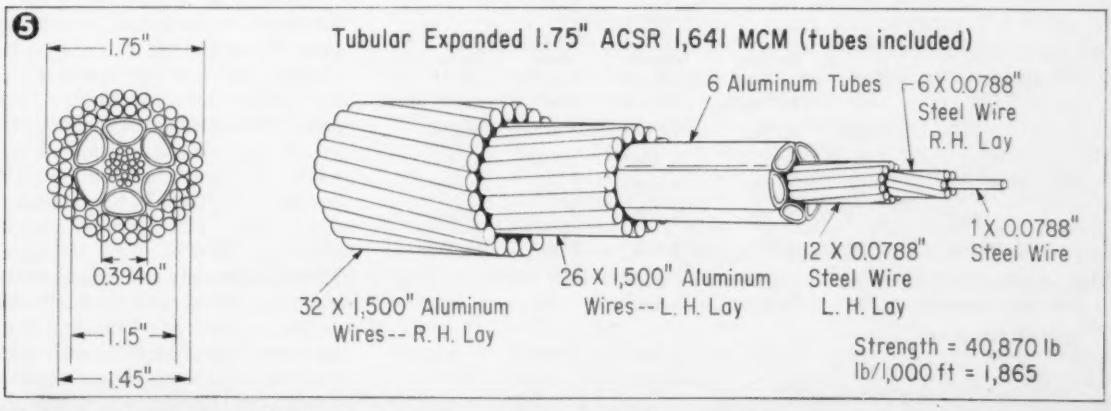

5
1.75"
0.3940"
1.15"
1.45"
Tubular Expanded 1.75" ACSR 1,641 MCM (tubes included)
6 Aluminum Tubes
6 X 0.0788" Steel Wire R.H. Lay
1 X 0.0788" Steel Wire
12 X 0.0788" Steel Wire L.H. Lay
26 X 1,500" Aluminum Wires -- L.H. Lay
32 X 1,500" Aluminum Wires -- R.H. Lay
Strength = 40,870 lb
lb/1,000 ft = 1,865

FIG 2—FIFTH CONDUCTOR, having aluminum tubes as expanding medium, will be tried in bundle construction on the middle phase in about 550, 445, and 1,245 ft long in 2,240-ft section out of Claysburg Substation

Table I–Calculated Conductor Values

Dia. In.	MCM	AC Resistance at 50 C Ohms/mile	Inductive Reactance Ohms/mile	Capacitive Reactance Megohms/mile	Surge Impedance Ohms/phase Mile
		24-Ft Phase Spacing			
1.40	1864[1]	.0558	.5734	.1390	282
1.60	2550[1]	.0416	.5692	.1370	279
1.75	2828[1]	.0378	.5631	.1357	276
1.75	3282[1]*	.0312	.5604	.1357	276
2.32	2294[2]	.0503	.7701	.1848	378
		39-Ft Phase Spacing			
1.40	1864[1]	.0558	.6323	.1534	311
1.60	2550[1]	.0416	.6281	.1514	308
1.75	2828[1]	.0378	.6220	.1501	306
1.75	3282[1]*	.0312	.6193	.1501	306
2.32	2294[2]	.0503	.7701	.1848	378

[1] Two-conductor bundle, 16-in. spacing
[2] Single conductor per phase
* Area of tubes included

bundle lines compared with single-conductor of larger sizes. To make this comparison conclusive, however, it would be necessary to string longer sections to allow time for improved organization and better use of manpower and equipment.

Spacing between conductors in the bundle will be 16 in. Flat-phase spacing will vary between 24 and 43 ft. It will be 24 ft on the four-pole tangent structure, where insulator vee-strings will restrain conductor side swing; 39 ft on laminated-wood, H-frame structure; and, 43 ft on steel-tower tangent structures, where single suspension insulator strings will be free to swing. Table I contains the calculated values of resistance, inductive reactance, and surge impedance for phase spacing of 24 to 39 ft.

In all, there will be about 15 structure designs, using various arrangements of wood poles, laminated wood, and steel towers. Suspension strings will contain 26 5¾ in. by 10-in., 25,000-lb rated insulator units, and in dead ends 30 similar units. Shielding rings will be installed on the conductor end of the strings.

Table II gives some idea of what the supporting structures will carry in loads per ft of conductor and overhead ground (static) wire, either bare or subjected to ice and wind loads as specified by the National Electrical Safety Code for the Heavy Loading District.

A variety of accessories will be used to obtain construction and operating experience for determining the most suitable and economical materials. At conductor suspension points, both twisted and preformed type armor rods will be installed. Suspension clamps will be aluminum alloy. Armor grip suspension units will be used at some suspension points, and corona spheres will be placed on the ends of armor rods. Splices and dead-ends will be compression type.

In two-conductor bundle sections, several spacers will be used, including solid bar, coil spring, and preformed types.

Table II–Conductor and Structure Loading

	Conductor MCM	Dia. In.	Loading—Lb Per Ft Vertical Wt., Bare Conductor	Vertical Weight, Conductor +½" Ice	Horiz. Wind 4 psf Ice	Resultant+ Constant of 0.31 Lb
[1]	932	1.40	2.804	5.167	1.600	6.030
[1]	1.275	1.60	3.654	6.266	1.733	7.122
[1]	1.414	1.75	4.254	7.053	1.833	7.907
[1]	1,641*	1.75	3.730	6.530	1.834	7.402
	2 294	2.32	3.375	5.129	1.107	5.557
Static Wires						
7 No. 6 Alumoweld		.486	.416	1.030	.495	[2]1.433
½" EHS Bethanized "C" steel		.495	.517	1.136	.498	[2]1.530

[1] Loading is for two-conductor bundle
[2] Used constant of 0.29 per NESC, 5th Edition
* Area of tubes included

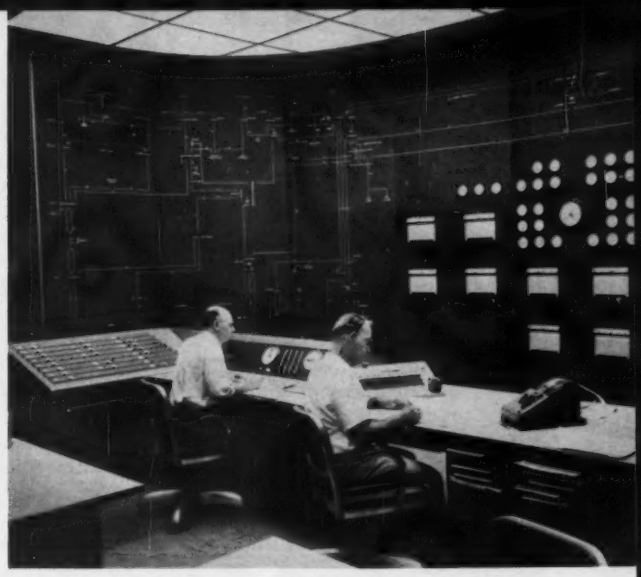
RI Tests Slated

All conductor will be strung under tension to minimize chances of abrasion which could result were the conductor pulled out over the ground. Lightning protection for the line will be two overhead ground wires, either 1½-in. Bethanized "C" steel or 1½-in. (seven-strand No. 6) Alumoweld.

Radio interference and corona loss will be measured. To facilitate RI measurements, wave traps will be installed between each of the four sections of line using different conductors so as to isolate noises produced by conductors in each section. Facilities will be on hand for opening the line between each of the four sections as well as at each end. This provision will permit the line to be energized from one end while noise measurements are made on one, two, three, and four conductor sections. The procedure can be repeated with the line energized from the opposite end. Such measurements, along with those on each section of the line closed at both ends, are expected to furnish comparative noise levels for each type of conductor. During noise measurements, a complete record will be kept of weather conditions.

Automatic Dispatch System Provides Economic Loading

'Cost' system of control loads units economically and makes a realistic determination of system transmission line losses



CENTRAL OFFICE SETUP shows computer section of Automatic Lambda Dispatch Console in front of man on left. Setter section is at his left

E. D. JAMES, Asst Supervisor of System Operation, General Public Utilities System, Reading, Pa.

"Automatic Lambda Dispatch" is the term assigned to the control and telemetering equipment and transmission loss computer which automatically and continuously dispatches generation on a GPU system basis, providing savings estimated at up to $100,000 yearly. It is a "cost" system of control—"lambda" signifies delivered cost of power—and provides the following benefits to system operation:

1. The most economical continuous incremental loading of the controlled units within a station.

2. The most realistic continuous determination of transmission losses within the system.

3. An improvement in the rate of response to needed generation changes by the controlled units.

4. Preparation for future parallel operation with areas under automatic load and frequency control.

Eleven Stations Controlled

There are 11 stations involving 29 units under control. Total capacity of the 29 units is 1,532 Mw. The units chosen for control application are those which are normally operated on a daily load curve, with the exception of base-loaded generating units.

The components of the automatic lambda dispatch system, which are for the most part completely transistorized, are as follows:

1. The Penalty Factor Computer continuously calculates the penalty factor for each station and external tie. Its heart is the matrix or analog which is an electrical equivalent of the GPU system transmission network. The equivalent values used in the matrix are based on a computer loss-formula study. The input to the matrix is the megawatt generation of each station and the megawatt flow in each external tie. These values, with a few exceptions, are continuously telemetered directly into the computer.

Changes cannot be readily made in the matrix to follow major changes in transmission. The matrix was designed to represent the system as it would be within a year or year and a half subsequent to the installation of the computer. This is due to the rather high expense associated with making the loss-formula computations upon which the "B" components in the matrix are fixed.

The transistorized electronic card components of the matrix are of sufficient cost that it was considered economically unsound either to carry spares to insert when a major transmission path is out of service, or to provide replacements when anticipated transmission comes into service. However, the cards are equipped with a variable resistance, in addition to the fixed resistance, so that corrective adjustments can be made either if the original values representing the "B" components have drifted, or to compensate for some changes in the system transmission network.

The output of the matrix is a quantity defined as "percent-of-power-delivered," and refers to the percentage of power generated at the station bus that is delivered to system load centers. System "running cost" is set manually on a computer dial calibrated in steps of 0.1 mill. This cost is received from the Pennsylvania-New Jersey-Maryland Interconnection Dispatcher by telephone and corresponds to the minute-to-minute assigned generation level for GPU system stations.

The assigned system "running cost" is then automatically biased by the "percent-of-power-delivered" quantity. The resulting station costs are telemetered to each station having controlled units. This is a continuous automatic function involving but one manual insert, that being the dial setting for the assigned GPU system running cost.

The computer also features manual digital "setters" for each generating station and external tie. As the functioning of the matrix is dependent upon generation and tie-line values telemetered into the matrix, a loss of telemetering signal would distort the continuous computations. Therefore, the manual setter can insert in the computer, in megawatts, the value corresponding with the generation or tie-line flow source whose telemetered intelligence has been lost. To facili-

tate this substitution, a complete audio and visible alarm system is provided to monitor all incoming signals to the computer.

Two indicating meters on the computer are operated by push buttons representing each station or tie-line. One meter indicates the percent-of-power-delivered for the selected source, while the other shows the station cost telemetered to the controlled units, or shows the cost at an external tie point. These meters separately monitor the send-out cost signal to each controlled unit as it is biased by the percent-of-power-delivered against the set system lambda cost. In addition, they provide the indicated cost at external tie points and the desired generation level cost at uncontrolled generation buses.

The push buttons and associated meters on the console are also used to ready the computer for study purposes. The setter section of the computer has, along with megawatt generation or tie-line flow setters for all stations and external ties, a percent-of-power-delivered setter for each generating source. In preparing to use the computer for study purposes, the operator first reads out, by pressing the push button, the percent-of-power-delivered for every station or tie. These values are inserted on the setter console and the unit is switched from "control" to "study."

A separate system lambda dial is provided for study purposes. With this dial and the megawatt setters, a study condition may be set up without interfering with the automatic dispatch. When the computer is being used for a study, the percent-of-power-delivered is fixed and represents, for the minute-to-minute computations, those matrix output values with which existed just prior to the transfer from control to study. Continuous recognition of line loss changes resulting from changes in station generation or tie-line flow is sacrificed for the duration of the study.

2. Central telemetering equipment and channels are located in the Central Office. This equipment provides station output and tie-line intelligence to the computer and prepares the station cost signal for transmission to the controlled stations. These quantities are transmitted into and from the Central Office over four leased audio-frequency, full-period trunks.

3. Telemetering receiving and retransmitting equipment is located at the three main dispatching centers which serve the two Pennsylvania and two New Jersey GPU companies. Each company's dispatcher monitors the station cost signals as they are transmitted to his stations. Three companies have a switch for each controlled station whereby the dispatcher may interrupt the telemetered cost signal emanating from the Central Office and channeled to any of his stations. This assures that the automatic control will not subject an area of any system to deficient or excessive generation during times of system stress or unusual planned line maintenance.

4. Station equipment consists of telemetering receiving hardware and station and unit control components. Devices which require monitoring and operational adjustments are located in the central control room. Telemetering receiving and equipment and other components which do not require operational adjustments are situated at available locations near the control room.

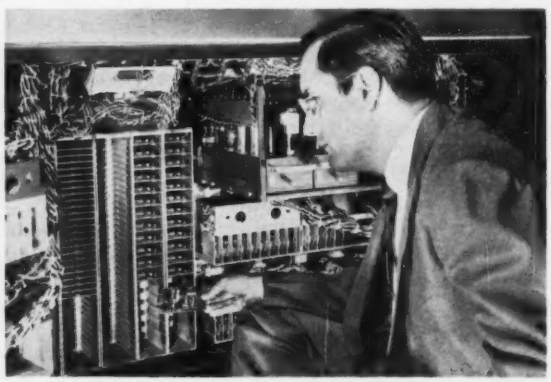
The incoming cost signal at each station is continuously indicated on the station control console. The station cost signal is fed into a function generator for each controlled unit. Cost vs megawatts is represented in the function generator, which is a transistorized electronic unit representing the controlled unit's applicable heat rate curve. Two manual setters bias the output of the device; one is fuel cost in cents per million Btu and the other, performance factor. The latter is expressed in percent and represents the effect of the plant operating conditions which existed during the previous month.

Cost Signal Transposed

The cost signal is thus transposed to a properly biased value representing desired generation in megawatts. This value is biased by the frequency circuit and compared with the actual megawatt output of the unit as derived from station metering circuits. The comparison indicates if there is a need for raising or lowering of generation. If the need exists, the controller permits the proper control impulses to actuate the governor synchronizing motor control circuit.

(*Continued on page* 192)

REAR OF CONSOLE in generating station control room shows compact enclosure. The photograph was taken at Pennsylvania Electric Co's Warren Station

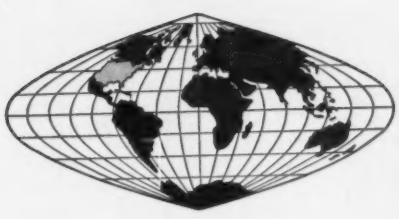


TRANSISTORIZED COMPONENTS of transmission matrix are located in the Central Office computer. 'B' constant cards are shown in the slotted bank

eei

28TH ANNUAL CONVENTION

■ "Leading the World in Electric Power—The American Way" was the theme of this year's Edison Electric Institute annual convention, held in Atlantic City, N. J., June 6-8. And EEI leaders, while recognizing the lead which the United States has over the rest of the world in electric power and the developments which will enable us to maintain that lead, cautioned repeatedly against complacency. The problems of the future for the electric utility industry—particularly the investor-owned portion of it—will be anything but easy. Moreover, they will cover an extremely wide range, varying from executive recruitment to resisting government encroachment to finding the $143 billion needed to quadruple their capability by 1980. The important thing, as President Allen King reminded the company executives, was that the job of meeting America's burgeoning power needs, even with all its attendant problems, is not too big for them. And, as much to the point, the American people will have to be convinced that they are equal to the task. Walter Lucking, president of Arizona PS called for a closer working relationship with the rural electric cooperatives; VP Robert MacDonald of West Penn Power unveiled a study which showed the industry's national advertising has not been all it should have been, and then mapped out a new approach. Other areas—system planning, engineering, power pooling, financing, safety, rates—also received their due . . . from the speakers and the conferees on the boardwalk in Atlantic City.



King Highlights US Power Lead, Warns of Problems Ahead.....p 94
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Convention Highlights US Power Lead, But Speakers Warn of Many Problems

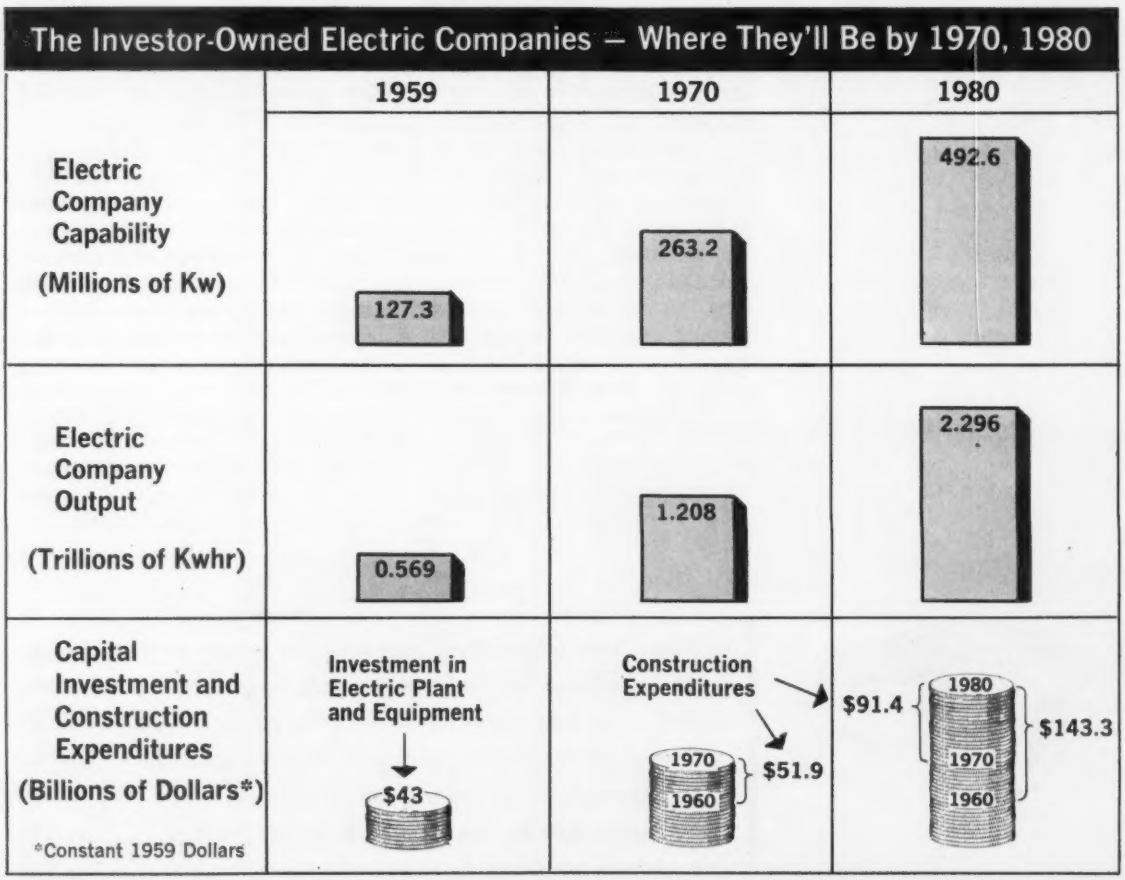
". . . The electricity we use today is estimated to equal the energy of more than 67 men working for every single one of us—67 men working for each man, woman and child in the country—at home, on the job, and in . . . the things we buy. By 1970 each of us will have at his service the equivalent energy of more than 112 men, and ten years later, 176 men . . ."

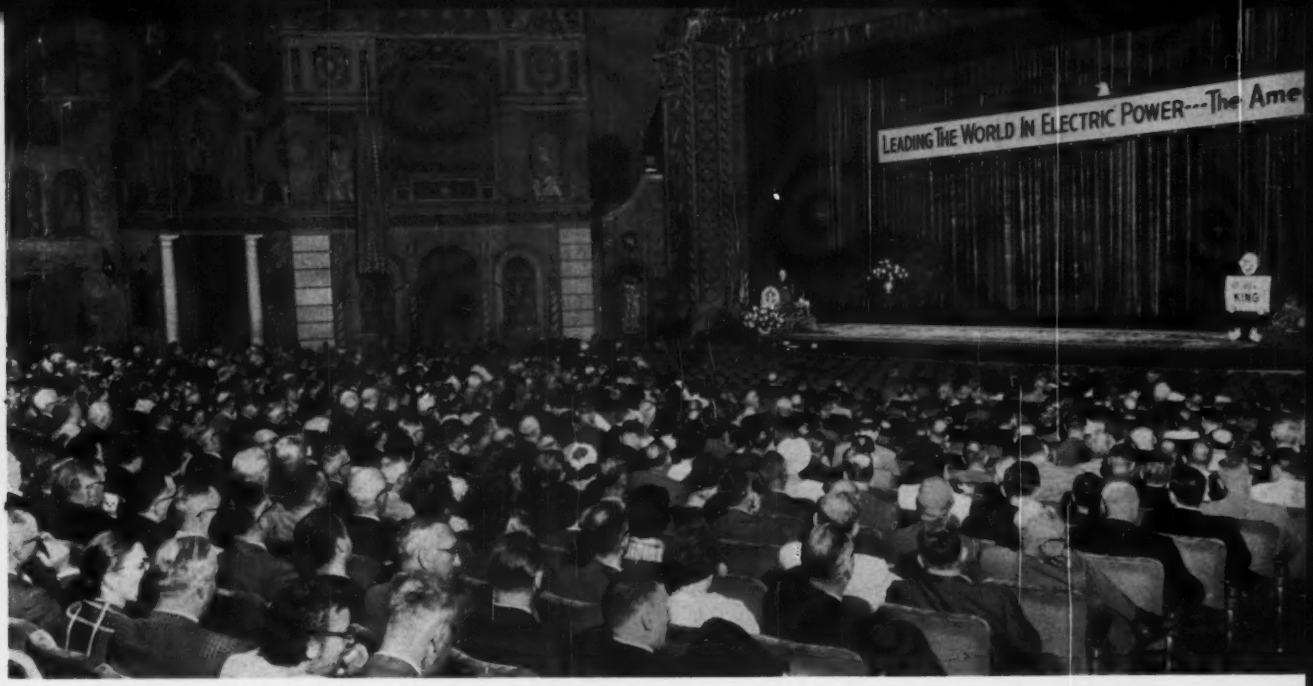
■ Those words, perhaps more than any others, tell the story of the economic life of the people living in America three-fifths of the way through the twentieth century.

They were spoken by a modest, soft-spoken man across a rostrum to some 3,800 people who have, in a very real sense, helped make the whole thing possible.

The speaker was Allen S. King, president of Edison Electric Institute and Northern States Power Co. The occasion: EEI's 28th Annual Convention, held in Atlantic City, N. J., June 6-8.

King's words, with all their implications for our unbelievably high standard of living, take on added significance when compared to what the rest of the world's people have to help them in their everyday lives—in their efforts to find food and shelter, in their attempts to enlarge their economic and industrial potentials, and finally, in their struggle against drudgery. King went on to make this com-





parison and to point out that the United States had reached this level through the efforts of "free men working under a system of private enterprise."

His thesis was the convention's theme ("Leading the World in Electric Power—The American Way"). And he went on to say that our great achievements of the future will also be—can only be—accomplished under the same system: "Today the US produces more electricity than the next seven nations in the world combined . . . About four times as much electricity is available to each person in this country as there is to each person in Russia . . . (and) we have achieved world leadership in power supply through the operation of our industry as a part of our free enterprise system. Only by maintaining our industry as an active part of American free enterprise we will move forward to new records of achievement in the future."

Scoring public power advocates' criticism of the investor-owned electric utilities as "Wall Street" domimated, the EEI president reiterated his call for a "Main Street" approach to its problems: "Even in our larger companies there is a neighborhood aspect to all our business dealings. We are truly operating down on 'Main Street'—and it is only when we forget this point that we seem to get into serious difficulties.

"It is at the neighborhood level that our companies have their greatest challenges. A consolidation of this neighborhood approach . . . would go a long way toward favorable solutions to certain of our national problems."

But if King favors the local approach (it was his stated purpose when he took office last year), he neglected neither the national nor international aspects of our world lead in electric power production.

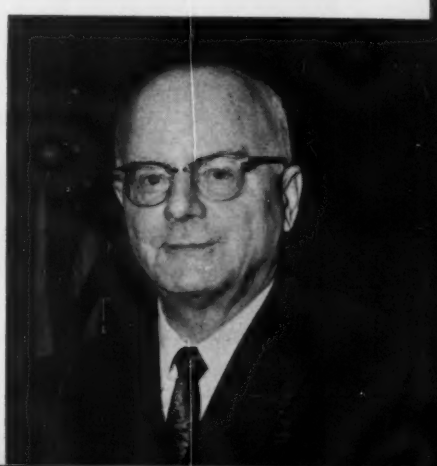
He highlighted the growth of the private companies through the next two decades (See chart opposite):

• **The total capability** of these companies by 1970 is expected to be 263.2 million kw—more than twice today's total. By 1980, it will stand at close to the half-billion kw level—492.6 million.

• **Total kwhr output** for the investor-owned companies will cross the *one trillion* mark sometime in the late Sixties, and by 1970 it is expected to reach 1.208 trillion kwhr. By 1980, it will be pushing 2.3 trillion kwhr.

• **What kind of money will it take?** Capital investment by the companies at the end of 1959 was $43 billion. By 1970 they expect to spend $51.9 billion for new construction, and by 1980 they will have shelled out an additional $91.4 billion. Altogether, then, new-construction expenditures in the 1960-1980 period will be about $143.3 billion, with the 1980 rate running about $12.5 billion a year. This compares to a 1960 rate of about $3.5 billion.

King feels the growth in gross national product, disposable income and personal savings will make the money available as it is needed.



ALLEN KING, EEI president, outlined growth of private electric utilities over the next two decades

'. . . We must invite the co-ops to benefit from and

■ In a speech that came as a surprise to many old-time EEI members and as a change of pace to some of the industry's "youngsters," Arizona Public Service Co President Walter T. Lucking called on the investor-owned utilities to "invite and urge the rural electric cooperatives to benefit from and contribute to the planning of the nation's electric industry."

Lucking's talk, titled, "The Rural Electrification Balance Sheet," assessed the present rural electrification situation. With 97% of the nation's farms electrified, 43% are customers of investor-owned utilities, according to Lucking. Some 40% are served by co-ops who buy their power entirely from the companies. "This means," said the Arizona PS president, "that not only do investor-owned utilities serve nearly half the nation's farms, but we have assumed the responsibility for supplying the power needs for 66% of these rural customers.

"These facts testify to the willingness of investor-owned utilities to electrify the nation's farms through their own resources as well as to assist the REA co-ops in their approach to what has been a tremendous problem to solve."

'The Co-ops Are Here and in Business . . .'

"Whether we like it or not," Lucking emphasized, "we must face up to the fact that REA co-ops are here and are in business in practically every state in the Union." He pointed out that 2% money and tax exemptions have combined to make most co-ops "prosperous business operations." Lucking added that many have departed from the original concept of farm electrification and are looking for commercial and industrial customers.

In the 25 years of the co-ops' existence, they have become a sizeable factor in the country's economy. There are nearly 1,000 of them in 46 states serving five million customers with gross revenues of $618 million. Thus, Lucking apparently feels, they cannot be ignored, and he called on the electric companies and the co-ops to "start on a two-way street of cooperative effort in relation to power supply, facilities planning, and common operational problems."

What made Lucking's remarks so significant was not so much their content, but the occasion and the general executive level of the people to whom he made them. For while EEI Managing Director Edwin Vennard called for much the same thing in sales before a joint company-co-op group in Phoenix, Ariz., a few months ago, this is a first time that a utility company president has called for such across-the-board joint action before the what is the most important utility executives' meeting of the year.

MacDonald Unveils LBE Advertising Study

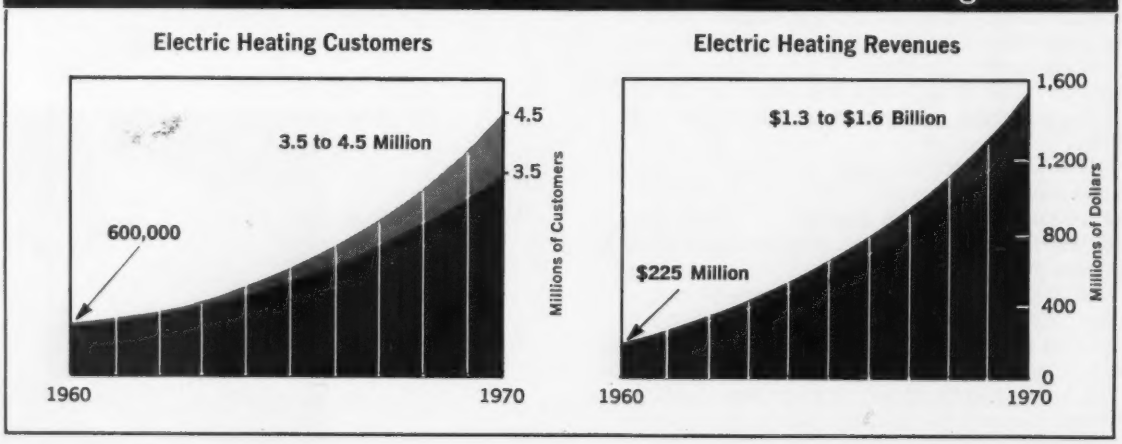
But if Lucking asked for a re-examination of the industry's position vis-a-vis the co-ops on the basis that it was outdated, West Penn Power's marketing Vice President Robert MacDonald took an even stronger stand on the industry's "Live Better Electrically" program, especially its advertising.

MacDonald, as chairman of LBE's Planning Task Committee, reported on a series of studies among utility men, appliance dealers and consumers, the results of which indicated that LBE national advertising was not so effective as it might be.

Among the utilitymen queried, "only one out of three felt that the national electric program was strong, while 71% rated the American Gas Assn's program favorably." MacDonald pointed out that AGA's sponsorship of television's "Playhouse 90" was widely praised by electric men, and added "that AGA's national promotional budget is about 120% larger than ours."

The same kind of reaction was found among 736 surveyed appliance dealers. According to the West Penn VP: " . . . Nearly twice as many rated AGA advertising ahead of the national electric program.

Electric Heat — Keystone of the All-Electric Home — in the Coming Decade



contribute to the industry'

Again . . . AGA was given enormous credit for its sponsorship of 'Playhouse 90.'"

But it was the findings of the depth study among consumers—and the changes in LBE advertising policies that resulted from them—that proved to be heart of Bob MacDonald's talk.

EEI's National Electrical Living Program, of which LBE is a part, is devoted to the concept of all-electric living. All-electric living, in the minds of most consumers, the motivation study showed, means modern living—but it also means *expensive* living to them. And it is here, says MacDonald, that we run into two major psychological hurdles: While "expensive living" has its own rather manifest obstacle, *modern* living—but it also means *expensive* living to much more subtle one of whittling away at her consciousness of her traditional mother-wife role. According to the psychologists, she actually feels *guilty* about having some of her household tasks—by which she earns the family's love—lightened! QED, according to MacDonald and his researchers: It is not enough to tell her that modern electrical appliances make her life easier and give her more free time. The advertising must go beyond that, and suggest a psychologically suitable use for that time. It must show her, in effect, that the modern conveniences help her become a better wife and mother, or in MacDonald's words, it must "give her the strong unselfish motivation she seeks—by showing her how appliances benefit the whole family, instead of just making her life easy."

And LBE ads during the next 18 months will attempt to do just that. In addition, they will "concentrate on only the most critically competitive subjects, which are: ranges, water heaters, dryers, heating and cooling, and the Medallion Home. HOUSEPOWER and lighting will be blended into the advertising wherever possible."

Ayers Sees Electric Heat Big in the 60's

Although he spoke a day later, Commonwealth Edison Co's Sales VP Thomas Ayers implicitly reaffirmed MacDonald's remarks with his speech, "Electric Heat—The Big Market of the Sixties."

Ayers began by saying that "To many students of marketing, electric heat is one of the greatest opportunities ever to confront our industry. Even so, I do not believe we utilities and manufacturers fully appreciate its potential." He went on to illustrate just how big that potential is (see chart at bottom of opposite page).

Ten-year projections, according to Ayers, see electric heating customers numbering 3.5 to 4.5 million, or 6% to 7% of the expected 60 million residential customers in 1970. "So the heating portion of the climate-conditioning market, *which is virtually inseparable from total-electric living,* has just left the starting post."

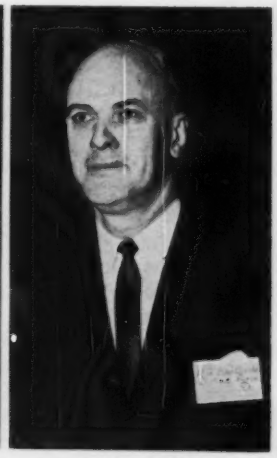
The all-electric home, said Ayers, offers manufacturers $1,500 apiece in equipment sales and utilities 20,000 kwhr a year in energy sales. "The projected four million electrically heated homes could use 80 billion kwhr a year—nearly half the electricity all residential customers used last year," he said.

LUCKING

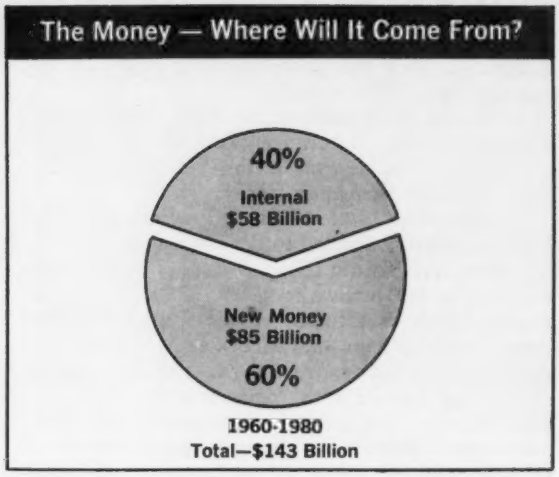
Ayers wants utilities to become more forceful in their electric heating advertising. He noted that "some otherwise effective advertising on electric heat is now diluted by its inclusion in ads on appliances, lighting, and so on. Electric heat is important enough to spread its own full page . . . it must be sold specifically, forcefully and repeatedly. This cannot be accomplished with tag-on references at the bottom of ads featuring 'Live Better Electrically,' or 'Total Electric Living.'"

He asked manufacturers and utilities to approach the heating market with a positive attitude and modern methods, to make it "the big one of the Sixties."

AYERS



MACDONALD



Speakers Focus Attention on System

■ Speakers at the 28th annual EEI convention left little doubt that if the US was going to maintain its world lead in electric power, the investor-owned electric utility industry will have to continually devote a great deal of time, attention and money to a number of critical areas and activities.

Three such activities are system planning (including power pooling), research, and engineering.

Speaking on the subject of "Patterns for Tomorrow's Power Needs," Pennsylvania Power & Light Co President and Chairman Charles E. Oakes put it this way: "The utilities cannot wait for the market for power to develop, and then proceed to build to meet it. They must plan far ahead so that the public can be assured of always having available an abundant supply of electric power."

Oakes Sees Output Related to GNP

In a detailed slide presentation on the future growth patterns and requirements for the industry, Oakes noted that by 1980, the US gross national product will be nearly one trillion dollars—double today's figure. "To reach this level," Oakes said, "will require a greatly expanded use of electricity—almost three kwhr per dollar of gross national product in 1980 compared to only 1⅔ kwhr today." (See chart above.)

Oakes outlined, in pretty much the same terms as Allen King (p 94), the growth of the industry during the next two decades, and then went on to say where the money to finance this growth would come from. Of the $143 billion needed for new construction by 1980, he sees $58 million of it being generated internally by the companies, and $85 billion as new money.

The increasing importance of interconnections and power pools was emphasized by the PP&L executive. He saw a number of advantages to tying systems together. Some of those he pegged were:

- Savings in production expenses and fuel costs.
- Reduction in the amount of reserve generating capacity.
- Greater load diversity with a system covering more than one time zone.
- Lower transmission line losses.
- Ability to install larger and more efficient generating units.
- Greater resistance to outage-causing damage in the event of war or emergencies.

He called also for greater equipment standardization but "not to the point where it develops into a road block to future technological progress."

One of Oakes' most significant points had to do with the perennial thorn in heavy electrical equipment makers' sides—the utility buying cycle. He asked for cooperation among utilities and manufacturers to eliminate it: "It is my belief that it would be advantageous to both the manufacturers and utilities, if the two got together, and scheduled the new units to be installed in such a manner that the manufacturing facilities would have a uniform rate of production."

The role of research in the electric utility industry is as old as the industry itself. Philip Fleger, Duquesne Light Co president, took the task of putting it in future perspective.

Fleger, after outlining what the electrical industry, both utilities and manufacturers, spends on research (see box on opposite page), acknowledged "that there are a number of problems that probably warrant more attention than we are giving them."

This raises the question of how utilities ought to approach these research problems. Fleger gave at least one answer: The EEI Board last December decided to investigate the possibility of financing an expanded research program similar to the way it

OAKES

FLEGER

FAIRMAN

Planning, Research and Engineering

pays for LBE. It now appears that the Board will take action on the matter this coming September.

Fleger outlined the program: "In view of the increasing importance of research and the rate at which this activity is expanding, consideration is being given to establishing a new division—the Research Division—within EEI."

But Fleger was quick to drive home the point that "Such an organization would not replace or conflict with the research activities of individual electric companies . . . or small groups of companies." Its big benefit, Fleger said, "would be to provide a regular, accessible medium for the exchange of information between companies concerning their research activities. It would also make it possible for . . . smaller companies which are not able to do research work of their own to participate in this important work. Nor would such an organization impede the competition between the electrical manufacturers in the research field. This competition has proved too valuable to be disrupted in any way."

The history of progress made by the electric industry is not characterized by "dramatic breakthroughs," but came about as a "result of slogging, day-by-day work." The statement is based upon the remarks made by James F. Fairman, senior vice president of Consolidated Edison Co, to the EEI convention. He maintained that the same kind of step-by-step procedure—with advances coming in little pieces—would continue to mark the industry's progress.

Fairman's name has long been associated with nuclear power development, and he left little doubt that he felt progress in this area would be of the same ilk. Indeed, he began by saying that when a reporter asked him recently whether we were "on the threshold of nuclear power," he "mentally tripped over that word, threshold, for it has always been my experience that every threshold we crossed led to other doors still closed or only partly opened."

Fairman is in favor of what he calls the "hard-headed engineer's" approach to the technical and economic barriers still before us. In hurdling these barriers, he believes "our greatest asset is the people who will do the work and make the decisions," and he did not limit this to engineers. "Without these people and their work, our voices are no more than 'sounding brass and clanging symbols,'" he said. Fairman's earnestness caused one prominent executive to reflect later that "*his* voice is certainly more than a clanging symbol."

Electrical Industry Research

UTILITIES—A recent EEI survey of 120 investor-owned electric companies indicates they spent more than $6.5 million on research, exclusive of nuclear research, during 1959. During 1960, the survey showed, they will shell out more than $8 million.

MANUFACTURERS—The cost of research by electrical manufacturers has been estimated at something between $100 million and $125 million annually, according to Philip Fleger, president and board chairman, Duquesne Light Co.

NUCLEAR—In 1959 electric utility companies spent more than $100 million on various phases of A-power research, including the construction of nuclear power plants. In 1960, they will be spending another $132 million.

eei 28TH ANNUAL CONVENTION

The Customers, the Stockholders & the Commonwealth Edison,

■ There are three distinct groups upon which any company, including an electric utility, depends for its profitability and existence. These three are its customers (the public), its stockholders, and its employees.

Speakers at the final general session of the EEI 28th annual convention touched, in one way or another, on factors affecting the relations between the utility company and these three groups.

Philadelphia Electric VP George Conover, in a talk titled, "Good Public Relations Must Be Earned," attempted to clarify such currently fashionable terms as "corporate image," "motivational research," and "uncensored abridgement." But all this was merely an introduction to Conover's main goal: a comprehensive definition of what is meant by "public relations," coupled with some detailed illustrations of its various phases.

He began by discounting the "the cynics (who) say it covers a multitude of sins; that it is nothing more than free publicity, concealed propaganda, or a means by which something unethical or undeserved can be foisted upon an unsuspecting public." Then he went on to say that it was "exactly what it says it is . . . relations with the public, the art of getting along with people. It is a continuing fundamental attitude of mind, a philosophy of management which unselfishly places the interests of the public first."

The responsibility in a utility for good PR, according to Conover, "starts . . . at the very top." Carrying out that responsibility toward the three previously mentioned groups—customers, stock holders and employees—must "never be casual." The PE executive listed a number of recommendations, all of which must reflect a paramount concern with the interests of the public, for, as he put it, "The success of a program does not depend on what you think of the public, but what it thinks of you."

Sees Big Role for Industrial Relations

The interests of one group—the employees—will assume increasing importance in the years to come, according to speaker Howard S. Kaltenborn of Westinghouse. Said Kaltenborn: "In the critical scene of the 1960's, favorable employee attitudes will emerge as a critical factor in management's long-term effort to . . . insure the continued profitability of the enterprise."

Kaltenborn traced the history of management's attitude toward employees to long before the terms, "employee relations" or "industrial relations" came into vogue. It was against this background that he made his statement stressing the increasing importance of employee attitudes, and called for an industrial relations program at any given company that had stated objectives plus a plan of management action, both of which are based on a company philosophy. This is an absolute necessity, said the Westinghouse vice president, because "the most important asset of a company—any company—is its people . . . and everything we do . . . in employee relations rests up the assumption that people are good, sensible and sound human beings who will make the right decisions when given full information and the opportunity to do so."

Wolfe Stresses Management's Safety Responsibility

Whatever other responsibilities utility top managements may have, Baltimore Gas & Electric Co President J. Theodore Wolfe did not allow them to forget the one they have for safety.

"The responsibility for safety cannot be delegated to a staff department. It is part of the job of every officer, every department head, every foreman, and every worker to avoid accidents. Unless that fact is clearly impressed upon and kept fresh in the mind of everyone . . . it is useless, to talk of improved techniques, better tools, or any of the other paraphernalia of a modern safety program."

Wolfe pointed to the "slightly better" electric utility industry's accident rate—6.06 disabling accidents per million man-hr for the utilities vs 6.47 for all American industry—and said, "I can't help wondering whether there aren't too many managements who are giving only lip service to safety."

Wolfe did not take much comfort in the details of the utilities' safety record. "Among 180 companies reporting their 1959 accident experience to EEI, 52 reported a frequency above the industry average. Of these, 33 were more than 50% above the industry

Allen King (above, left), president of Edison Electric Institute, presents the Edison Award to Willis Gale, chairman of Commonwealth Edison Co, at the close of EEI's 28th annual convention. Commonwealth Ed received the industry's highest honor for "enlightened, significant contribution toward the development of economic nuclear power" in the completion and operation of Dresden Nuclear Power Station, the nation's first large privately-financed A-plant. The award was also given in recognition of CE's "outstanding efforts in the

Employees

SPEAKERS covered public, customer, stockholder and employee relations. From l to r, J. Theodore Wolfe, president, Baltimore G&E; Howard S. Kaltenborn, vp, Westinghouse Electric Corp; and George R. Conover, vice president, Philadelphia Electric Co

average, 17 were more than double the industry average, and five had the dubious distinction of reporting accident frequencies from five to nine times the industry average."

The BG&E executive decried thinking of safety solely in economic terms. "There is no such thing as a tolerable level of accident frequency unless it be zero," he said. Safety, he maintained, is primarily a matter of human values rather than economic ones.

He listed 10 steps the EEI Accident Prevention Committee developed to be taken by utility top management:

1. Attend and participate in employee safety activities.

2. Establish and maintain an active safety policy.

3. Include safety performance in evaluating your personnel.

4. Support reasonable disciplinary action for failure to follow established safety practices.

5. Hold every level of supervision accountable for safety.

6. Provide for effective training.

7. Provide an adequate, competent safety staff.

8. Place equal emphasis on accident prevention as on production.

9. Demonstrate that safety is an integral part of operations.

10. Direct engineering and operating personnel to consult safety representatives on safety of design.

Electric Cars Receive Much Attention

The electric automobile, about which the industry has heard so much recently, evoked widespread interest and attention among the utilitymen and their wives.

Eureka-Williams Co displayed twelve of its "Henney Kilowatt" cars, including two previously delivered to Atlantic City Electric Co. The dozen represented one-fourth of the manufacturer's output. By meeting's end, firm commitments were reportedly received for all cars produced so far, and an order backlog was slowly building toward the 50 mark.

Several changes have been made in the car since its introduction at the Southeastern Electric Exchange meeting in March. The stepless controller formerly in the rear seat section has been replaced by a compact conventional six-step unit. Built-in main and auxiliary-battery chargers have been added. The unit's price remains at $3,650.

While the convention was the scene of more than one animated discussion on the practicality of the car, or its potential as a load-builder, several prominent industry officials maintained that investment in the cars by utilities was, in effect, an investment in research . . . "and a good investment at that!"

One of them circulated some correspondence between an electric car manufacturer and a utility dated 1911. The utility was planning to spend $100,000 to push "electrics in competition with horses, buggies, wagons and gasoline cars," and wanted to know how the manufacturer would help. Among other sales aids, the car maker offered to sell one unit to utility officials at a discount price of $1,200. The wholesale price at the time was $1,440 and the car sold at retail for $1,800—in 1911. He pointed out that "the direct use of electric vehicles to the lighting companies of Detroit averages $7,500 a month; 90% of this current is used after peak load is off. Your territory can do the same."

FloridaP&LWinAwards

promotion of low-cost residential electric space heating." The award consists of the plaque (shown) and a $1,000 contribution to the company's employee benefit fund. In the photo on the right, Ashton B. Collins Sr (right), president of Reddy Kilowatt, presents the Reddy Kilowatt Award to Pres Robert H. Fite of Florida Power & Light Co. The Reddy Kilowatt Award is given to that electric utility company which, in the opinion of an independent panel of judges, has prepared and submitted the best annual report for the preceding year.

EEI Elects CL&P's Sherman Knapp

The new president of Edison Electric Institute is a young (55) electrical engineer (Cornell '28) with a pragmatic mind and a smiling disregard for finely spun ideologies and theories.

Sherman R. Knapp, president of Connecticut Light & Power Co has been with that company all his business life. He began in the summer of 1927, before graduation, and joined the company full time in the Research Dept—"such as it was in those days"—in 1928. He was transferred later to engineering and then to sales, and moved steadily upward through the latter until, in 1948, he became executive assistant to the president. In 1949 he was made executive vice president of CL&P, and in 1952, at the age of 46, he was elected president.

He has long been active in industry affairs, especially the Electric Companies Advertising Program (ECAP), the Public Information Program (PIP), and—evidently—Edison Electric Institute. The diversity of his utility background will no doubt prove invaluable to him in his new role as EEI president.

In the exclusive interview with Electrical World, printed on these pages, Knapp spoke frankly and to the point on a variety of industry problems and projects.

Speaking of projects, his pet one is to get electric utility companies more active in urban renewal and rehabilitation—especially in the national ACTION program—to, as he puts it, "Make our cities once again fit places in which to live."

Q. *Mr Knapp, as incoming president of EEI, what do you see as the electrical industry's most pressing problems?*

A. Well, I see three principal areas to which I feel we need to devote attention, and during my term I hope to work towards their solution. These are: (1) The matter of tax inequities between private and government owned utilities, combined with indiscriminate government credits to these latter utilities and the equally indiscriminate application of the preference principle, is our most important problem; (2) Urban renewal and rehabilitation is another area in which our utility companies must do more than they are now doing, especially in connection with the national ACTION program; and (3) More progress must be made toward building a nation-wide system of interconnections and power pools before the federal government steps in with the false argument that the job is too big for us.

Q. *The industry now has four separate organizations —EEI, ECAP, PIP, and NAEC—all of which are steered by committees with overlapping members, and which work in related areas. Do you favor a consolidation of these groups?*

A. Definitely not. If we put all four groups into one organization, I'm afraid we'd lose our present flexibility and diversity. The organization would become monolithic. Besides, from a political viewpoint within the industry, I don't think you could do it.

Q. *Do you think we will see many more big mergers in the industry?*

A. I think not. As I said in answer to your first question, I think whatever consolidating activities go on now, they will be more in the nature of interconnections, joint company planning on a regional basis, etc. This sort of thing is in the cards; it has to come. It is the way we will grow in the future. We have got to learn how to develop the big grids that will become increasingly necessary.

Q. *What kind or kinds of research should be carried on by the utilities?*

A. Let me begin by saying that there are an almost infinite number of research problems and projects in which utilities should engage. I think many of them can and should be done—indeed, they are being done —through EEI. I should point out, I think, that there will probably be no dramatic research "giant steps" or "breakthroughs." Progress, in this field, as most others, comes in short steps. I might add that Cresap's (Mark Cresap, president of Westinghouse) remarks this spring about urging utilities to consider the research facilities of electrical manufacturers as their own makes a lot of sense to me. Only by working jointly with them (the manufacturers) can we continue to hold and drive down the cost curves.

Q. *How do you feel about the atom? Will electric power from it become competitive soon?*

A. Frankly, I'm bullish about nuclear power. As you know, my company is participating in the Yankee atom plant; we are now ahead of schedule and below budget. We think that perhaps by the second or third round of fueling, we're going to get power that will be very nearly competitive in New England. I look for a Connecticut Light & Power A-plant within this decade.

Q. *Let's talk about sales. Do you think electric heating will be the big load-builder in the future?*

A. Unquestionably, it will be the biggest load-

1960-61 President

builder for the industry, especially those companies with summer peaks. And it is going to greatly increase revenues. For some companies and areas, however, I think it will be awhile longer before electric heating really becomes a major factor. Let me also say a word about street lighting . . . My company reversed itself some years ago, and decided to push street lighting even though it would mean higher taxes. We have had some success, and I am proud of the national recognition of that success, and although our excellent street lighting has meant higher taxes, nobody complains because they're all for it. We've found it has superb public and community relations value, and we make money from it. Can you ask for more?

Q. *Does the inconsistency in state and federal regulatory practices bother you?*

A. Not really, because it doesn't matter. Each state and area has different regulatory ideas arising out of varying local conditions or traditions, and each company has learned to live with them. However, I believe the need for consistency will become more important as the interconnecting and regional planning I spoke of subjects more companies to multi-state and Federal Power Commission regulation.

Q. *There has been some talk of a national "spokesman" for the industry. Do you favor the idea? Would you act in such a capacity as president of EEI?*

A. No, it's idealistic because no one man—even the EEI president—is authorized to speak for all member companies. The nature of the issue determines who will speak for it. It might be EEI, or NAEC or PIP . . . or even me. I do recognize the need to state the industry's position on a given matter as soon as possible after the matter has been brought to the public's attention, and I think we might give some thought to the best way to do that.

Q. *What is your attitude toward the REA co-ops?*

A. Well, as you may know, we have no co-ops in Connecticut, and I've never dealt with them at first hand. And while I oppose the tax federal credit and tax inequities that they enjoy as a privileged group, I also agree with Walt Lucking (see page 96) that they are very much with us, and we ought to work with them in those areas where we have a mutual interest.

EDISON ELECTRIC INSTITUTE OFFICERS—1960-61

The following officers, other than Pres Sherman R. Knapp, were elected by the EEI 28th annual convention: Philip Fleger, Duquesne Light Co, vice president; Edwin Vennard, vice president and managing director; H. S. Sutton, Consolidated Edison Co, treasurer; and A. B. Morgan, secretary.

Areas to which we must devote much time and . . .

. . . attention include tax and credit inequities . . .

. . . urban renewal, and regional interconnections.

Expansion in the 60's will be enormous; for finance men, the question is . . .

Where Will the Money Come From?

■ It is all very well to talk glowingly of the growth of the electric utility industry during what has been termed the "Golden Sixties." But the fact is that this growth is going to require a great deal of capital, and utilitymen are seriously asking themselves: Just where is all this money going to come from? And what can we do to make getting it easier and cheaper? In an attempt to put together some answers—or at least, beginnings of some answers—a panel of financial experts in utility securities did some "thinking aloud" for the benefit of EEI convention-goers.

Members of the panel were (see above), l to r, Harold Scaff, vice president, Ebasco Services, Inc; Gerald Ives, vp, Morgan Guaranty Trust Co; Harold Young, of Eastman Dillion Union Securities Co; Fred Page, vp, Tri-Continental Corp; and George Conklin Jr, vp of Guardian Life Insurance Co.

Ebasco's Harold Scaff, pointing to the $51.9 billion needed during 1960-70, indicated that $4.34 billion would come from retained earnings, $16.63 billion from depreciation accruals, and $30.93 billion in new capital. However, Scaff said, "These figures are 1959 dollars. Hence, should inflation continue, the amount of new money required would be much greater. If no big variations occur, and your capital structure remains about the same, new capital will have to be raised as follows: Long-term debt—$19.20 billion; preferred stock—$3.56 billion; and common stock—$8.17 billion.

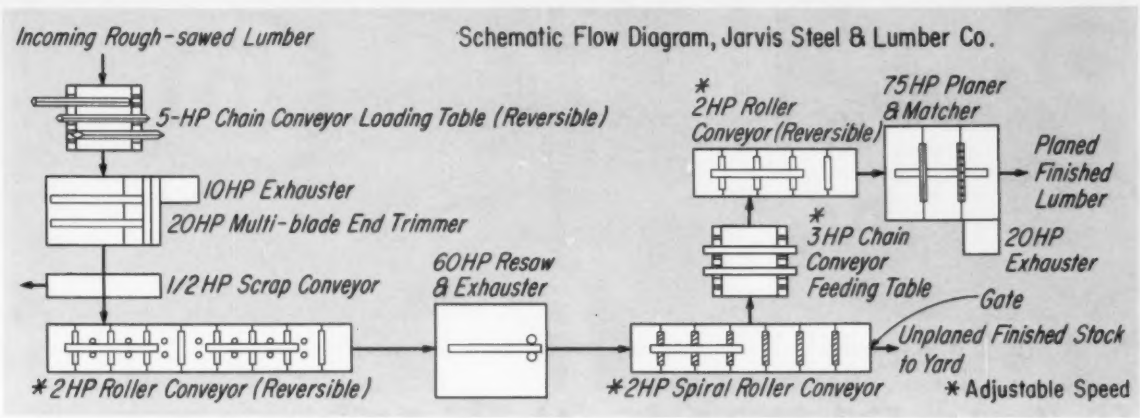
Gerald Ives of Morgan Guaranty Trust, looking at the situation from "the viewpoint of the commercial banks," cautioned the utilitymen that commercial banks can "temporarily ease your problem, but cannot help in long-term financing." He pointed out that "sufficient bondable additions to completely retire bank loans from sales of first mortgages" would be viewed as good credit by commercial banks.

Harold Young of Eastman Dillion took the viewpoint of the investment banker considering the utility's permanent financing. He sees two big problems: (1) "Many electric companies have already done so much financing that some buyers have as much paper as they really want;" and (2) Competition for funds is intense from real estate mortgages, other corporation securities, and tax-exempt government bonds. Young's Rx: Seek out the best buyers (at the moment, pension funds, mutual funds, etc.), give some consideration to convertible securities, and "take your potential buyers' wishes into consideration, and vary your plans and procedures as necessary."

Tri-Continental's F. W. Page, representing the institutional investor, pointed to inflation and high taxes as factors favoring the sale of common stock over fixed-income securities. He told the utilities to try to sell them at a high premium over book value in order to produce, say a 6% return, with a big 50% expansion program underway. And "since premiums are produced mainly by high-price earnings ratios, you should continuously strive for a maximum ratio for your stock."

G. T. Conklin Jr of Guardian Life Insurance advised the EEI men on making their securities attractive to life insurance companies. Conklin cited the life insurance tax law with its 85% intercorporate dividend tax credit as making the after-tax yield on preferred stocks, including electric utilities' preferred, more attractive.

The panel members also made some other suggestions. Among them: Come to market more frequently, but for smaller amounts of money. Be flexible to take advantage of changes in desires of bond buyers. Build your reputation as growth companies, and don't hesitate to go to your commissions to keep up your earnings.



Automation Boosts Lumber Mill Productivity 60%

L. A. ROBL, Industrial Power Representative, Baltimore Gas & Electric Co

"Every time a human touches a a piece of lumber it costs money."

This philosophy at the Jarvis Steel & Lumber Co in Baltimore, was the spark for a sweeping automation program that eliminated the lumber industry's traditionally inefficient methods of handling lumber, produced a sharp upsurge in productivity, and brought mill owners from far and near to see the new production line.

Now the mill receives lumber at one end, automatically passes it from one production machine to another, and discharges it finished to specification and ready for delivery. Attesting to the wisdom of the modernization program are:

- A 50% reduction in manpower for manufacturing
- A 60% increase in output.

Jarvis collects and seasons rough lumber from saw mills, then processes it to individual orders for retail lumber yards and large commercial users. Specifications vary considerably, may require any combination of cutting to length, resawing to thickness, or finish planning. Thus the mill is designed so individual production machines can be by-passed and conveyors reversed for maximum working flexibility.

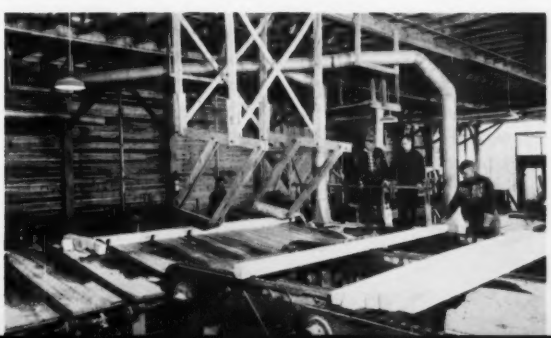
Woodworking machinery includes a 75-hp Newman planer and matcher, a 60-hp Mershon resaw, and a 20-hp Montague automatic end trimmer. Automatic electric controls on the trimmer "measure" each rough piece and position the saws to trim to maximum length.

All the connecting conveyors are individually motored, with variable speed drives. They can be easily adapted to all types of production and used with larger, faster production machinery if more output is needed in the future.

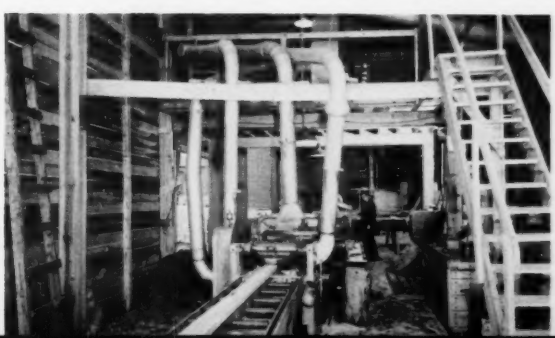
Only three men are needed as operators. Their sole functions are to change production set-ups on the tools and eliminate the infrequent jams that occur. Operating speed of the various machines on the line are so well-coordinated that finished boards leave the planner matcher butted together in a continuous line.

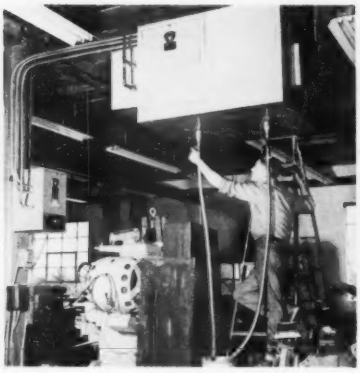
Responsible for the highly successful modernization was a detailed, 6-month study of mechanized handling in a concrete block and brick plants and numerous other installations — even conveyor systems in bakeries — to determine an effective and economical means of handling lumber. Workers at the mill were encouraged to contribute their suggestions. This produced a number of ideas that were worthwhile.

RANDOM LENGTHS ENTER TRIMMER. Automatic controls position saws, spaced at 2-ft intervals, to maximize lengths



FINISHED PLANKS LEAVE 75-HP planer in continuous line. Sawdust is picked up by exhaust fan, then bagged and sold





Electrostatic precipitator...

...keeping walls and air clean...

Eliminates Fire Hazard in Machine Shop

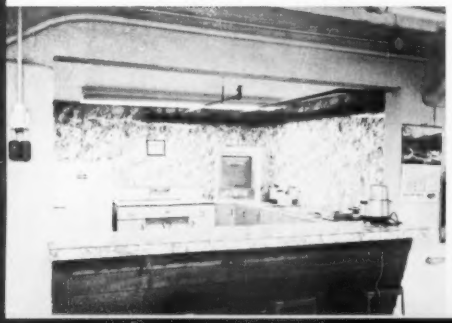
ARTHUR T. PHOENIX, Industrial Power Engineer, West Penn Power Co, Washington, Pa

A modern, electrostatic precipitator that wrings oil, smoke and odors out of the machine shop air is paying big dividends to the Crile Manufacturing Co in Washington, Pa. For example, it has eliminated a fire hazard —since oil can not accumulate on the ceiling. With cleaner lighting fixtures and walls, shop lighting is better and more efficient. The air is clean and clear. And the men feel more comfortable.

After the air is drawn into the prefilter, it passes over the oil-collecting cells which precipitate thousands of suspended particles of oil, dust, and dirt. Operation is completely automatic. Maintenance is limited to a periodic draining of the captured oil and opening a valve for 15 minutes every two weeks to flush the condenser plates. The precipitator, handling 2,000 cu ft of air per minute, serves the entire 61,000 cu ft machine shop. It is rated 3 kw.

Crile's experience can be summed up this way. The costly, unreliable way to clear the air in a machine shop is to open windows and doors and hope there is enough draft. The better and more dependable way, an electrostatic air cleaner.

Productivity Gains Show Value Of Modern Methods



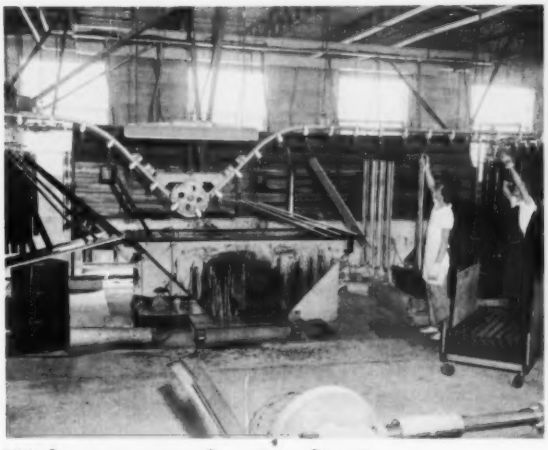
R. D. RINE, Industrial Power Engineer, Ohio Power Co, Coshocton, Ohio

Modern methods of heating, lighting, cooking and power distribution are clearly illustrated in a 6,000-sq ft plant addition built at the Ohio Fabricators, Inc, in Coshocton, Ohio, manufacturer of industrial screens, filters, and assemblies. Among the benefits: fewer rejects; increased production rate; improved employee morale; and increased pride of ownership.

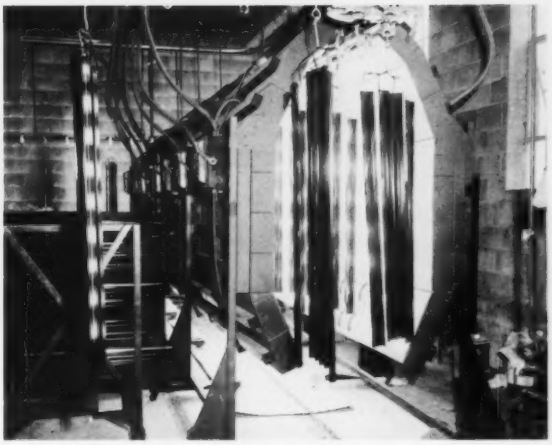
Typical of the modern techniques is the 225-ft-candle lighting for fine machine shop work and inspection. By lighting all 5,000 sq ft of production space to this level, machine tools and inspection benches can be relocated easily. Production line flexibility is enhanced by plug-in bus duct distribution.

The production area lighting uses continuous rows of 4-tube, 4-ft, instant-start fluorescents on 6-ft centers. In the 1,000 sq ft of office space, recessed fluorescent fixtures with plastic diffusers provide 100-ft-candle lighting. Light ceilings, walls and floors eliminate glare or harsh contrasts.

Seasonal heating for the offices is provided by 15 kw of duct heaters in 5-kw stages controlled by a 3-stage thermostat. Previously, on cool spring and fall mornings and evenings, the central heating system had to be operated to provide heat for this area. A completely electric snack bar for employees uses 19.4 kw of cooking equipment with an additional 5 kw of electric water heating.



With automated paint dipping...



...and electric drying...

Conveyor Cuts Paint Costs 50%, Trims Labor Use

JAMES E. CLARK, Power Sales Engineer,
Dayton Power & Light Co, Dayton, Ohio

An 80% reduction in direct labor costs is only one of the benefits of a new dip painting and electric drying installation at the Standard-Dayton Corp, Dayton, Ohio. In addition, the conveyorized finishing line has eliminated a serious bottleneck in the production of checkout counters and display equipment for supermarkets. And the automatic dip painting requires 50% less paint per piece than the spray method formerly used.

With the old method, seven men, at an average of $2.00 per hr, were needed for the operation. To meet production needs, they worked an average of 20 hr per week overtime. The new system can be operated by two men at $1.65 per hr. Time studies showed that direct labor cost for the new installation is 0.5 cents per piece, compared to 2.5 cents for the former system.

Moreover, production has increased from 540 to 720 pieces per hour. An unexpected saving was the discovery that paint costing only $3.40 per gal could be used with the dip system, while paint used for the spray method cost $3.75 per gal.

Infra-Red Oven Solves Paint Drying Problem

N. R. GALLATIN, Industrial Engineer,
Metropolitan Edison Co, York, Pa.

An inexpensive infra-red dryer put an end to a difficult paint drying problem and a serious production bottleneck at the Hartlaub Furniture Co in McSherrystown, Pa. Before the installation, orders for the company's tapered wooden legs for chairs and tables were piling up for lack of an effective drying method.

Four banks of infra-red lamps, totalling 6 kw, were installed on the end of a conveyorized dip-painting machine. The dip-painter was turning out 24 finished legs per minute, with a high gloss, colored finish. Although the limited area available in the machine required a few trial and error adjustments, the completed line is now turning out 720 dozen legs per day, at a power cost of less than 0.25 cents/dozen.

Before the infra-red lamps were installed, Hartlaub tried piping hot air from the furnace. This stirred up dust, ruined the finish, and threatened to make the entire plant unbearably hot in mild weather.

What's Your Production Problem?

If you have problems in lighting, drying, casting, forging, painting, or materials handling, consult your local power company. Let their experienced specialists show you how to cut costs with electric power.

Comparison of Power Use and Cost

	Before Installation of Heaters (12/57 to 11/58)			After Installation of Heaters (12/58 to 11/59)		
Month	Demand	Kwhr	Net Bill	Demand	Kwhr	Net Bill
Dec.	10	1,210	$40.57	*206	17,940	$589.54
Jan.	10	1,920	53.11	*184	13,120	477.98
Feb.	38	4,620	136.12	*200	16,160	553.13
Mar.	39	6,090	160.37	*200	15,680	545.69
Apr.	42	7,750	190.52	*172	14,800	490.89
May	41	7,460	184.55	*120	12,000	371.05
June	43	8,530	204.07	44	11,120	231.35
July	41	8,220	196.33	44	13,600	254.91
Aug.	43	8,840	207.80	44	11,280	232.87
Sept.	41	6,610	171.38	*100	14,240	366.83
Oct.	36	4,780	135.66	*156	14,880	468.61
Nov.	38	7,060	173.94	**336	30,000	962.59
TOTALS		73,090	$1,854.42		184,820	$5,545.44

Annual increase in Kwh 111,730 (152%) *300 heaters installed
Annual increase in Bill $3,691 (200%) **500 heaters installed

First year's operating experience shows...

Heaters Are Bargain for Drive-in

J. HOMER SHAW, Commercial Director
Business Development Dept, Utah Power & Light Co, Salt Lake City

At an operating cost of only ten cents per car, an installation of 500 electric car heaters has doubled the annual patronage of the Park-Vu Drive-In Theatre in Salt Lake City. Moreover, the heaters have extended the showing season from 8 to 12 months, so there is no idle investment during the winter. And, with increased patronage business at the snack bar has tripled.

The first 200 heaters, each rated 750 watts and 240 v, were installed in Nov, 1958. As a result of the increased attendance, 100 more were installed one month later. In November, 1959, after one year's experience, another 200 were added.

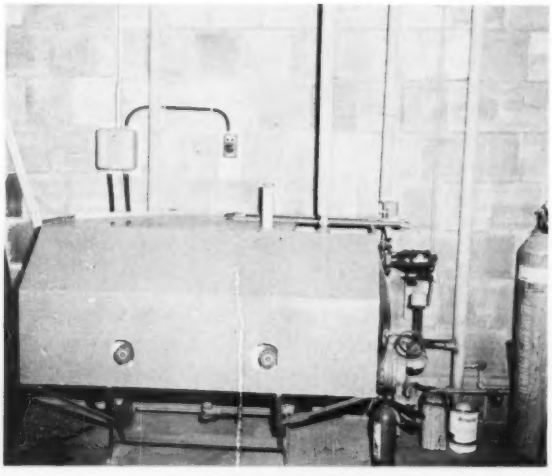
Each speaker post is individually wired for the heaters from load centers along one side of the field. A single line fault can only affect two spaces. As the motorist enters the theatre, he is given a portable heater which he plugs into the speaker post. As he leaves the theatre, he returns the heater to an attendant at the exit.

On mild evenings, patrons who do not want a heater are given a check, in lieu of a heater, which must be turned in as they leave. This prevents loss of heaters.

Demand, kilowatt hours, and net billing for the 12-month periods before and after heater installation are shown in the accompanying table. Summer demand is 44 kw. In cold weather, with 300 heaters installed, demand varied from 120 kw in May to 206 in December. During the 12-month period shown there was only one month, Nov, 1959, when all 500 heaters were installed. Demand for this month was 336 kw.

Average number of customers in a car is about three. At an admission charge of $1.00 per person, the regular rate, average revenue is $3.00 per car. Cost of electricity for a double feature show, running about four hours, is approximately 10 cents per car. Increase in kilowatt hours was 152%; increase in billing, 200%.

Heaters Assure Year-Round Hot Water Supply

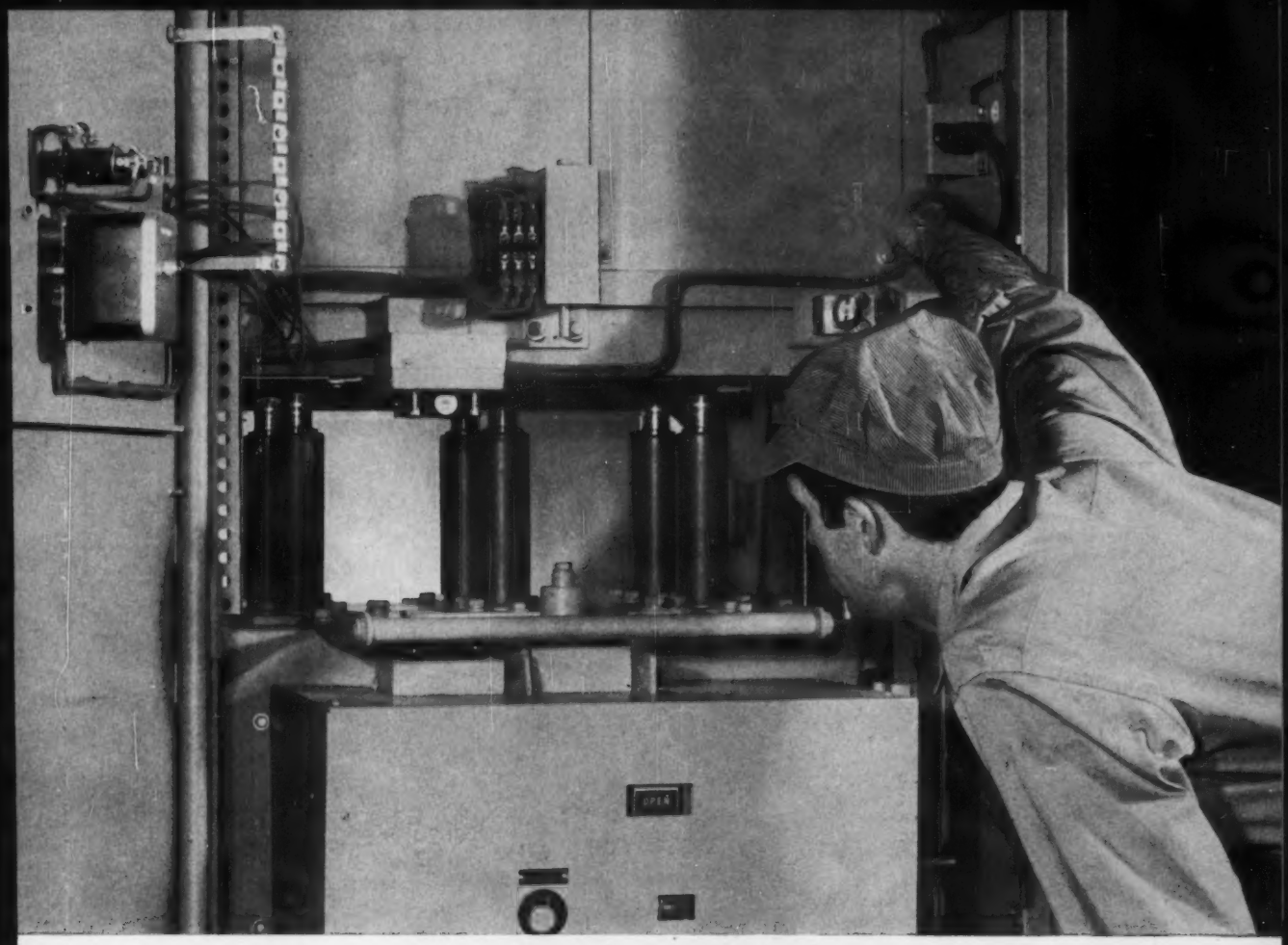


GLEN J. ALDEN, Industrial Sales Engineer, Minnesota Power & Light Co, Duluth, Minn.

Spring, summer, fall or winter, the pilots and mechanics of the Air National Guard base in Duluth, Minn now have an ample supply of hot water for showering and cleaning up, thanks to a simple electric heating installation. Installed in 200 or 400-gal hot water tanks in the hangar and administration building of the 179th Fighter Interceptor Squadron, two 9-kw, 208-v immersion heaters automatically maintain hot water when the base central heating plant is shut down. Thermostats hold the water temperature at 150 F. Although the central heating system has heat exchange coils in the tanks, it is operated intermittently in the spring and fall and shut down completely in the summer. Consequently, before the immersion heaters were installed, men had no hot water to clean up at the end of the day or after flights.

Change hats with your maintenance man, he will demonstrate . . .

SAFETY YOU CAN SEE



Only General Electric *Vertical Lift* Metal-clad Switchgear lets you see when it's disconnected

When your maintenance man operates General Electric Vertical Lift Metal-clad switchgear he can *see* when the primary disconnects are parted. He knows the breaker is safely open—a really important safety factor when he's working with thousands of volts of electricity.

General Electric Vertical Lift is the only switchgear design which gives you this safety bonus. Allowing your operator to visually check also reduces the possibility of outages which damage equipment and halt production.

Safety you can see is another reason why General Electric manufactures Vertical Lift design Metal-clad switchgear.

Contact your General Electric switchgear representative for more information, or write for Metal-clad bulletin, GEA-5664, to Section 511-37, General Electric Company, Schenectady 5, New York.

VERTICAL LIFT'S 3 STEPS TO SWITCHGEAR SUPERIORITY:

STEP 1: (Illustrated) Disconnect breakers automatically—only Vertical Lift design permits operator to actually see when disconnects are parted.

STEP 2: Remove breaker, slide out box barrier—Vertical Lift design allows operator to inspect contacts without moving arc chutes.

STEP 3: Remove protective cover—only Vertical Lift Metal-clad has the breaker operating mechanism up front for easy access.

Progress Is Our Most Important Product

GENERAL ELECTRIC

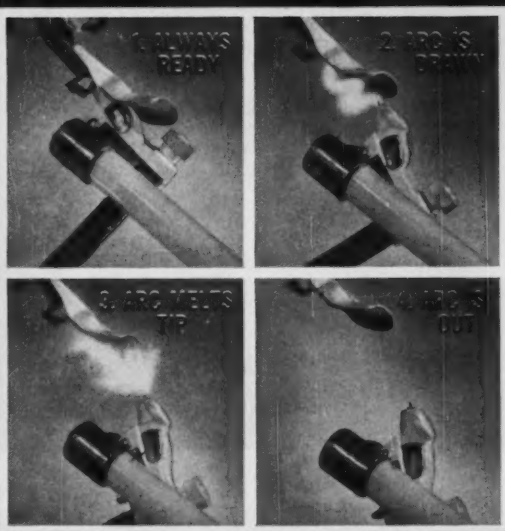
NEW open-dropout cutout with

exclusive gas load break

Now you can get more efficient load switching with greater safety for your linemen. *All* of General Electric's open-dropout cutouts are now available with an exclusive gas-load-break feature. You can use them for low-cost load switching for branch and feeder circuits, or on capacitor or transformer banks.

Gas load break is inexpensive, simple, reliable, and easy to operate. A simple pull of the switch stick is all that's required to operate the device. The lineman has complete control at all times.

You'll find the exact cutout you need in General Electric's complete line of open-dropout cutouts. Interrupting ratings are 5000 and 10,000 amperes at 7.8 kv, and 4000 and 8000 amperes at 15 kv. All units are available with 200-ampere disconnect blades. All are economical, safe, and easy to use and exposed parts are corrosion-resistant. Ask your General Electric sales engineer to tell you about the many other advantages of G-E open-dropout cutouts. Or mail this coupon today!



GENERAL ELECTRIC CO., SECTION A488-06
SCHENECTADY 5, NEW YORK

Please send me the cutout publications I have checked below:

- ☐ Bulletin GEA-6825, "Oil Cutouts for Fusing and Switching"
- ☐ Bulletin GEA-1816, "Open-dropout Fuse Cutouts with Gas Load Break"
- ☐ Bulletin GEA-4224, "Flip-open Fuse Cutouts"
- ☐ Bulletins GEA-6208 and 6245, "Enclosed Cutouts"
- ☐ Please have a G-E Sales Engineer call.

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COMPANY_____

ADDRESS_____

CITY_____ STATE_____

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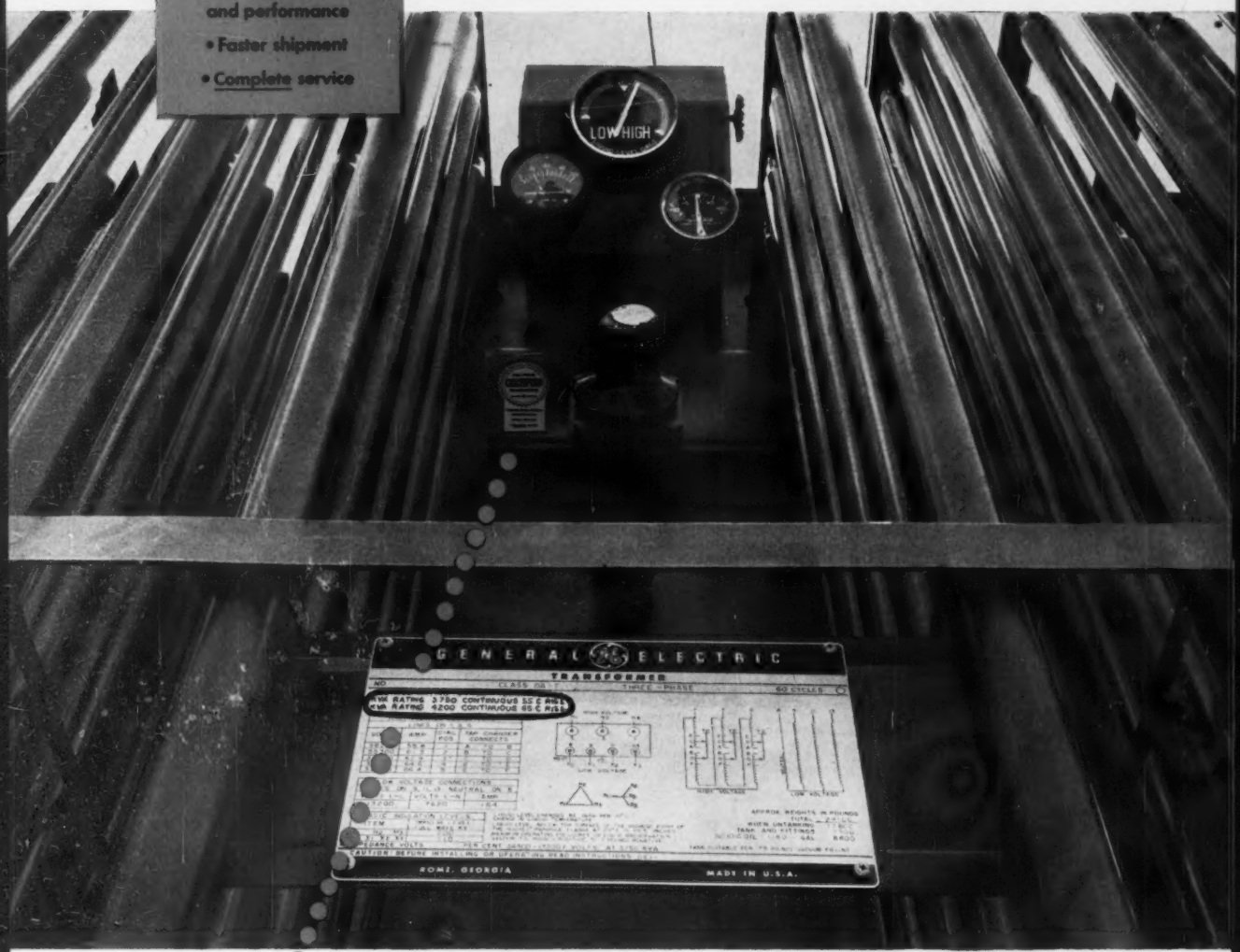
FULL-VALUE
CERTIFIED
TRANSFORMER
GENERAL ELECTRIC

- Superior design, features, and performance
- Faster shipment
- Complete service

NOW 12% higher



SYMBOL OF FULL VALUE

With this seal, General Electric certifies full value for your transformer dollar; full value in terms of superior basic design, features, and performance . . . plus faster order handling and shipment . . . plus complete service before, during, and after installation. No other transformer manufacturer can match this complete General Electric package.

continuous loadability

General Electric's new Permalex* insulation system increases medium transformer continuous kva capability, or gives five times longer transformer life

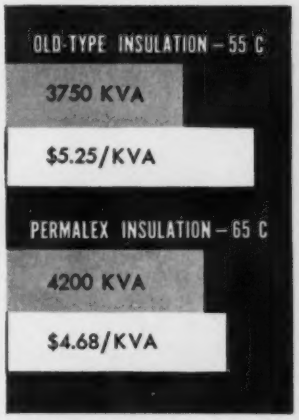
Now, as standard on all medium transformers**, and at *no extra price*, General Electric uses Permalex insulation . . . a system permitting transformers designed for 55 C rise to operate at 65 C rise with 12% more continuous capacity!

For example, a 3750-kva, 55 C transformer with Permalex will operate at **4200 kva**, 65 C rise with normal life expectancy. Or, if you prefer to operate the unit at 55 C, you can expect five times the life of present insulating systems! Fan-cooled rating increments remain the same and can be applied at the 65 C operating condition. Also, Permalex is *completely compatible* with everything in the transformer.

The Permalex system used in General Electric medium transformers features Formex† wire and cyanoethylated paper insulation. Formex insulated wire offers exceptional dielectric strength, outstanding thermal stability and high resistance to moisture effects. Cyanoethylation, which replaces many moisture producing molecules with non-moisture producing molecules, raises the thermal endurance of paper and retards the formation of water.

Ask your G-E Apparatus Sales Engineer to point out the many ways you save with Permalex insulated transformers . . . another result of General Electric's *continuing* Certified Full-value Transformer Program. General Electric Company, Schenectady 5, New York. 416-29

* Trade-mark of General Electric Company.
** 501 to 7500 kva, 69 kv and below.
† Reg. Trade-mark of General Electric Company.



PERMALEX INSULATION gives you extra kva at no additional transformer cost. The result is more economically uprated substations because of the lower cost per kva with no increase in transformer size.

55 C Self-Cooled	65 C Self-Cooled	65 C Fan-Cooled
750 kva	840 kva	966 kva
1000	1120	1288
1500	1680	1932
2000	2240	2576
2500	2800	3500
3750	4200	5250
5000	5600	7000
7500	8400	10500

DEFERRED CHANGEOUT of added kva gives more years of operation without extra investment. Real evaluation of Permalex is measured by present worth of capitalized value of deferred investment.

FORMEX TURN INSULATION with cyanoethylated paper insulation provides high dielectric strength, outstanding resistance to moisture and much longer life for medium transformers.

Progress Is Our Most Important Product

GENERAL ELECTRIC

Gas Analysis Detects Incipient Faults

A "Fault Detector" developed by Pennsylvania Transformer Div, McGraw-Edison Co, can determine the existence of low-energy incipient faults in transformers having an inert-gas atmosphere above the insulating oil. Using the newly-developed equipment and procedure, it is possible to take gas samples from energized transformers to determine whether an incipient fault exists.

Because the equipment is portable and a gas sample can be taken without de-energizing the transformer, on-the-spot evaluation is significant. When the detector indicates an incipient fault, an evaluation of its significance can be made to estimate the urgency of taking the unit out of service. Thus an outage can be predicted and planned in advance, minimizing the inconvenience and cost of a failure. In some cases, correction and repairs will be possible in the field without untanking, and in all cases of detection before actual failure or relayed outage, the damage to a transformer is greatly reduced.

Gas samples can be analyzed and evaluated regardless of their source. Accordingly, although developed for transformers, the equipment and procedure may logically be adapted more broadly for preventive maintenance programs.

Tests show that while at least 18 different gases are produced by incipient faults, not all of these appear in the gas cushion above the oil. The absence of some and the modified concentration of other gases is due to the varying proportions of gases produced by different types of incipient faults and the solubility characteristics of the various gases.

For example, acetylene is very soluble in oil. As a consequence, though a gas sample collected in the immediate vicinity of a low-energy fault usually contains a substantial amount of acetylene, a gas sample taken from the gas space rarely contains any. Therefore, very early in the development, equipment for the detection of a single gas, such as carbon monoxide or acetylene, was found to be of little value and was abandoned.

Development was then directed toward the present detector, which responds accurately to the significant gases produced by transformer faults. Results obtained were consistently confirmed on a mass spectrometer and by other established laboratory methods.

Gas samples from more than 200 energized power transformers of several different makes, installed on a number of power systems, were analyzed. Incipient faults were indicated in four transformers. Physical examination by the various manufacturers disclosed the actual faults in all four cases. These were corrected by the manufacturers before they developed into extensive in-service failures. Patent protection is being secured both for the procedure and equipment.

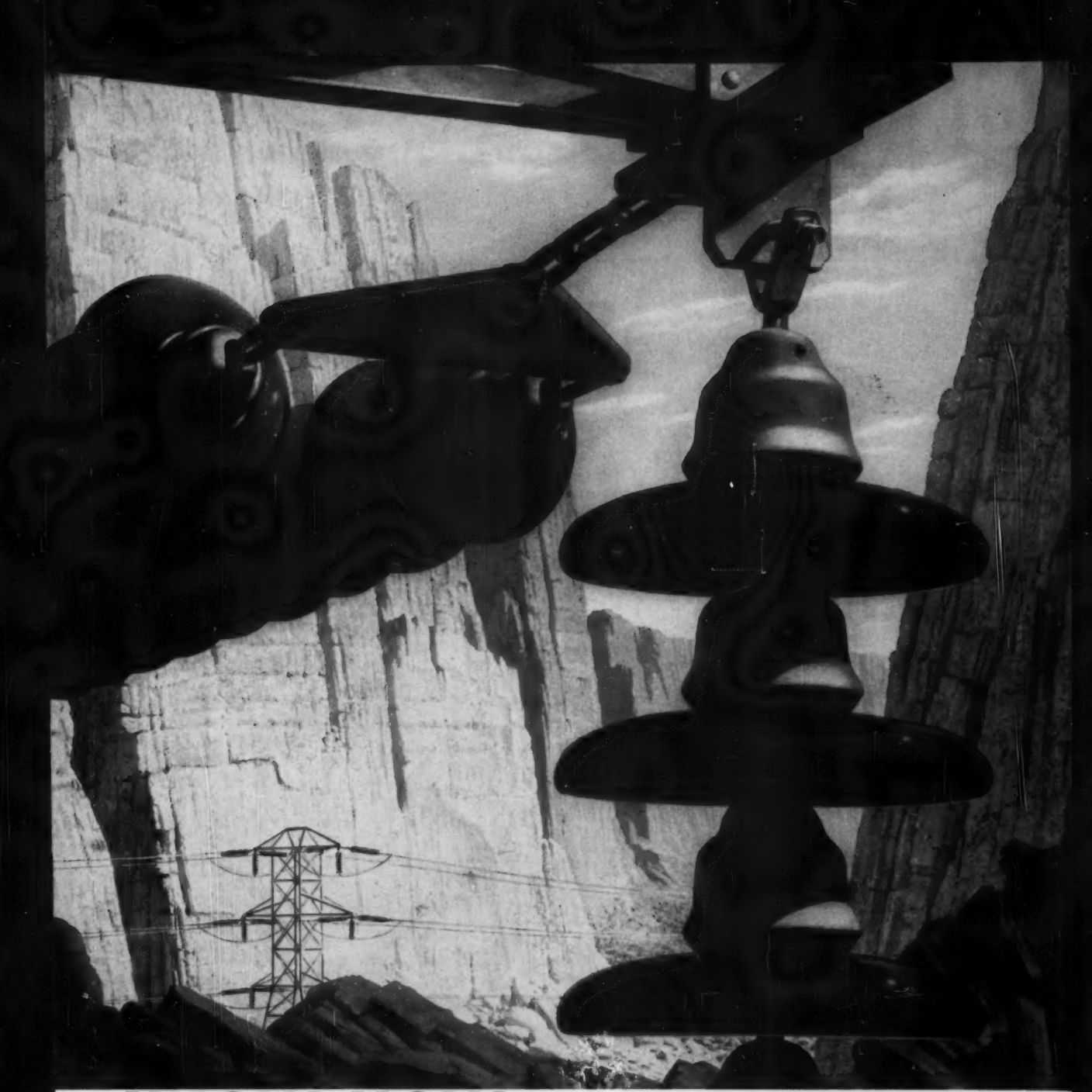
Additional Uses Planned

At its present stage of development, the main function of the equipment and procedure is the early detection of incipient faults by gas analysis. However, because of its sensitivity and characteristic response to certain gases, investigations are being made to classify types of faults by gas analysis. It has been shown in the laboratory that there is some relationship between the concentration and kinds of gas present and the types of incipient faults which caused them.

Three typical classes of faults are (1) those involving bare current-carrying parts and oil, (2) those involving insulated current-carrying parts and oil, and (3) those involving insulation adjacent to metal parts and oil. A classification of evolved gases related to the materials involved in the fault and its magnitude would be helpful in determining the probable trouble area and also provide a guide for determining the urgency with which corrective steps must be taken.

Presently, all portable testing equipment is being operated at a Pennsylvania Transformer laboratory. This permits the analysis of the greatest number of gas samples, taken from the greatest number of sources by means of sampling cylinders supplied by Penn Transformer.

QUANTITATIVE ANALYSIS of gas samples is made in the laboratory from gas sampling bottles sent in from the field. Eighteen gases can be identified



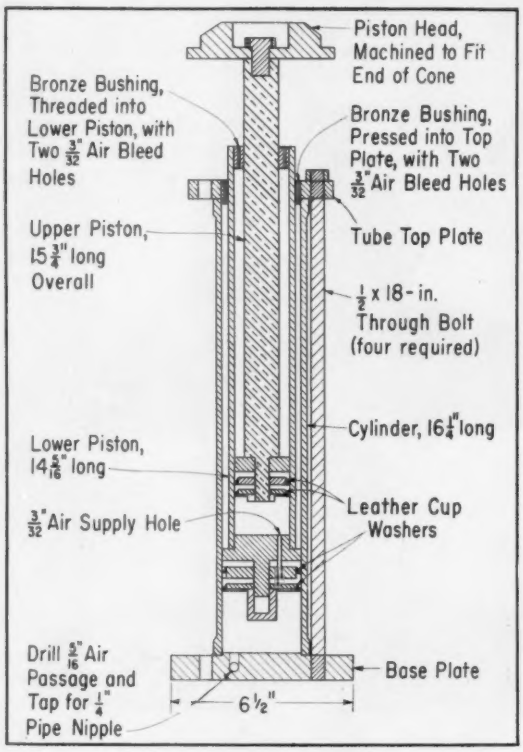
KNOW-HOW

Victor 900 Suspension Insulators (EEI-NEMA, TDJ52-3) are universally used by utility men because they're rugged and built to last.

Looking at a VICTOR Suspension insulator, you'd think it was an easy item to manufacture. It isn't. You don't just stamp them out like cookies, bake them in an oven and presto—insulators. No, a lot of research, engineering and manufacturing know-how over a long period of years is required to produce insulators that have uniform performance characteristics and far exceed EEI-NEMA standards.

VICTOR has an enviable reputation for knowing how to make insulators that are superior in performance under the most gruelling conditions of service. Many a power man has decided to play safe . . . and choose VICTOR. For catalog, specifications and prices, contact your nearby Victor sales office. Victor Insulators Division, I-T-E Circuit Breaker Company, Victor, N. Y.

I-T-E CIRCUIT BREAKER COMPANY


Piston Head, Machined to Fit End of Cone
Bronze Bushing, Threaded into Lower Piston, with Two 3/32" Air Bleed Holes
Bronze Bushing, Pressed into Top Plate, with Two 3/32" Air Bleed Holes
Tube Top Plate
Upper Piston, 15 3/4" long Overall
1/2 x 18-in. Through Bolt (four required)
Cylinder, 16 1/4" long
Lower Piston, 14 5/16" long
Leather Cup Washers
3/32" Air Supply Hole
Drill 5/16" Air Passage and Tap for 1/4" Pipe Nipple
Base Plate
6 1/2"

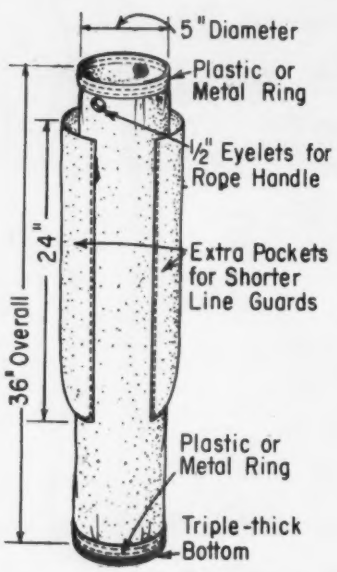
Jack Handles Cones for Fly Ash Separators

Removing and replacing cones in fly ash separators at the Johnsonville Steam Plant of Tennessee Valley Authority is a much faster and safer operation with the use of a two-stage jack. The pneumatic device is of great assistance in handling the 90-lb cones, which formerly were handled by workmen overhead at arm's length.

With more than 4,000 of these cones to maintain, the plant forces designed and constructed a compact unit that provides a long lift and still can be handled and set up in close, cramped quarters. A hose connected to the station service air system supplies air to the jack. A three-way valve admits air for lifting, closes for holding, or releases air for lowering the cones.

In operation the jack is positioned under the cone to be removed and the ram is run up snugly in the end of the cone. After the cone-holding nuts are removed, the jack lowers the cone out of the cluster to a position where workmen can safely handle it. This procedure is reversed for returning a new or repaired cone to its position. The cone can be seated firmly and held in place with the jack while bolts are installed and tightened.

Raise Line Guards Safely in Canvas Bag



ASA C. RANDALL, Operations Clerk, Green Mountain Power Corp, Montpelier, Vt.

A simple canvas bag has solved the problem of raising aluminum conductor guards of the preformed type to a lineman on the pole. The bag holds the guards safely, eliminating the hazard of their fanning out and contacting energized lines or equipment. It also prevents individual strands from falling out.

The line guard bags were made up by a local upholstery firm at $5 each. The bag has plastic or metal rings stitched into the canvas to hold the top open and at the bottom to provide a flat surface for stability. The bottom is triple-thick for extra wear.

The top of the bag has eyelets for a rope handle. Extra pockets are stitched to the sides to hold shorter lengths of line guards.

Repair Oil Leak in OCB Quickly

A leaking circuit breaker was repaired easily and quickly by Korea Electric Co, Ltd with the use of a steel-adhesive combination called Plastic Steel. Oil was leaking from the joint between the steel band and the insulating porcelain of the circuit breaker. About ¾ lb of the powdered steel-epoxy adhesive was applied to the leaking area. No leakage has resulted after several months of operation. Plastic Steel is a product of Devcon Corp.

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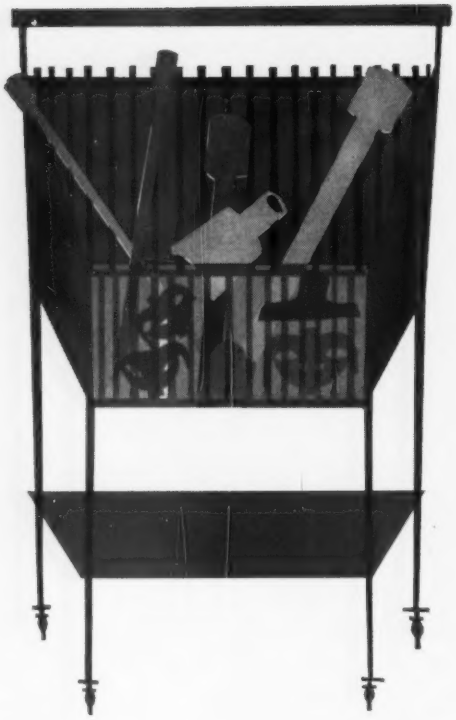

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ONE-STOP SHOPPING

4. ALUMINUM ELECTRICAL RIGID CONDUIT

Only from Alcoa can you get a complete line of conductor, conduit, bus, accessories, and tools for applying accessories.

And with Graybar you have a single source—one-stop shopping with undivided responsibility for bringing you exactly what you need, when you need it.

So . . . when you think aluminum, say "Alcoa." And once you've said "Alcoa," it's time to call Graybar.

ROME CABLE
DIVISION OF **ALCOA**

GraybaR PRODUCTS OF QUALITY

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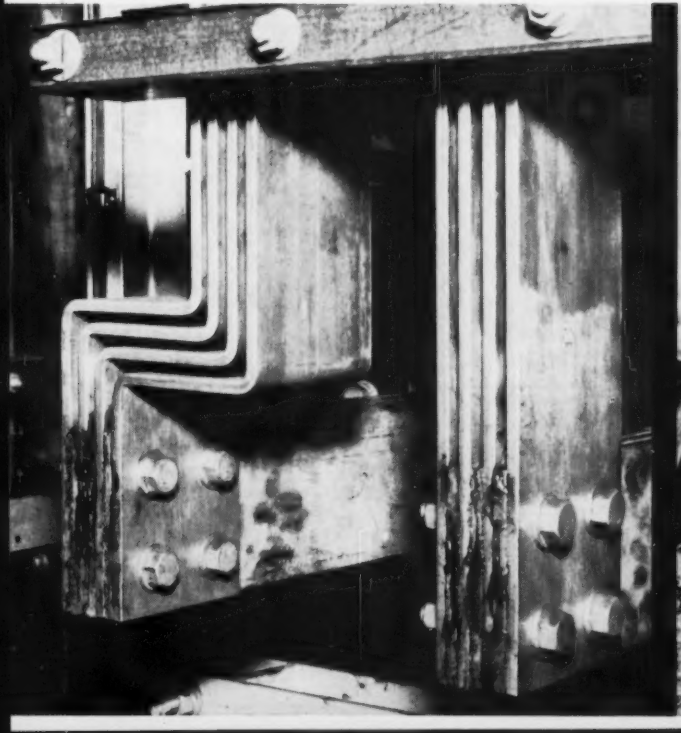
3. COMPLETE LINE OF CONDUCTOR ACCESSORIES

FOR ALCOA ALUMINUM

5. BUS CONDUCTORS

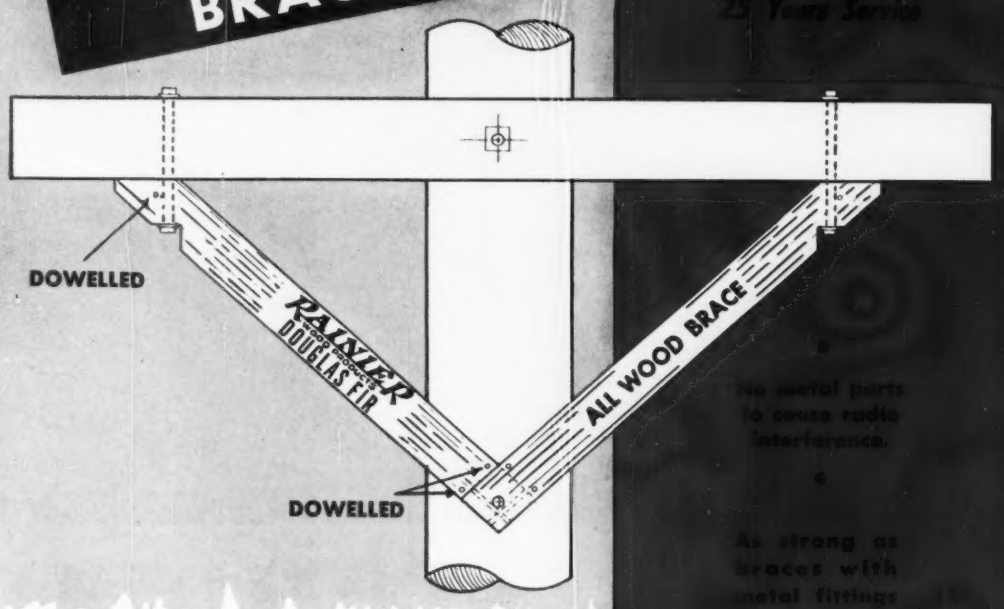


6. TOOLS FOR APPLYING ACCESSORIES

HELP SAVE ON MAINTENANCE

GRAYBAR Everything Electrical

RAINIER WOOD PRODUCTS CROSSARMS BRACES



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No metal parts to cause radio interference.

As strong as braces with metal fittings and cost one-fourth less.

No right- or left-hand members. (Any two pieces make a pair).

INCREASE INSULATION

REDUCE COST

Complete insulation at lower cost

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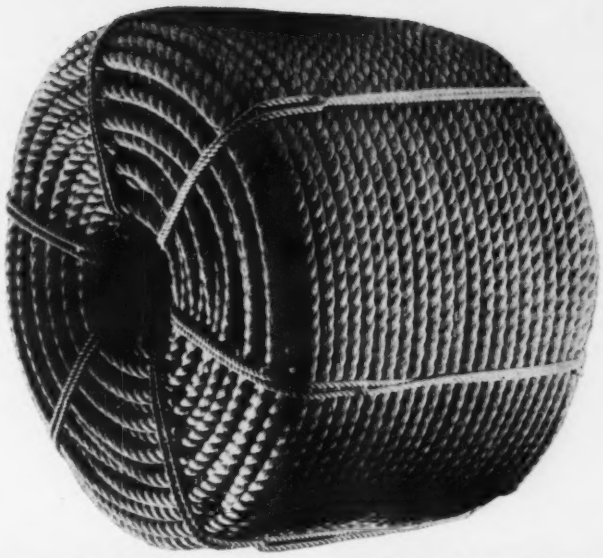
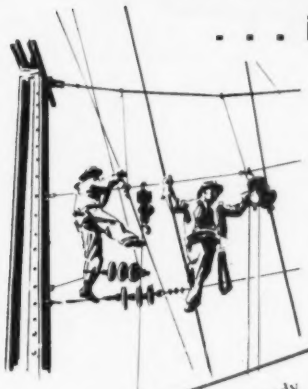


UTILITY LINES

reduce installation and maintenance costs . . . improve operations, enhance safety



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AMERICAN manufactures a complete line of ropes of both natural and synthetic fibers in coils or on reels.

MANILA — Special construction and exclusive lubricant reduces water absorption to a minimum and increases its resistance to weathering.

NYLON — About twice as strong as natural fiber rope. High strength permits the substitution of smaller and lighter lines to accomplish the same jobs. Easy to handle, impervious to rot, greater flexibility and resistance to distortion and kinking. Possess high shock absorbency and high impact strength.

Floterope® — Of polypropylene and polyethylene. 75% stronger and 35% lighter than manila. Excellent insulator; exhibits low dielectric loss. On some installations, insulators, special fittings and general brackets can be eliminated; fewer poles and wider spans are possible; ice build-up and lightening damage can be reduced. In a wide variety of solid colors and combinations of colors.

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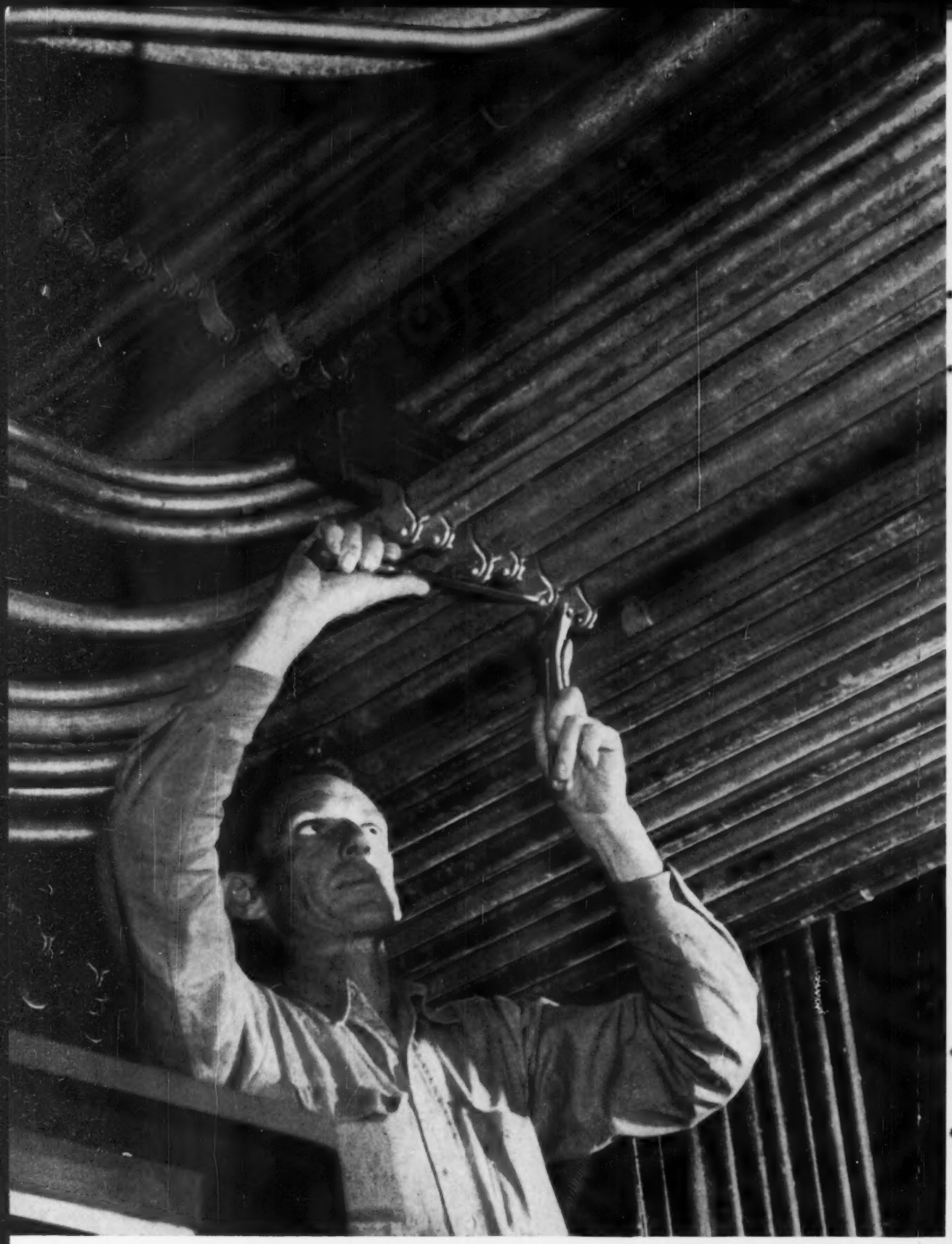

GraybaR PRODUCTS OF QUALITY

PROBLEM:

Protection from high-voltage failures due to cable overload.

SOLUTION:

Build up a dependable power system for today and tomorrow—with high-voltage Anaconda Butyl (AB)—insulated Durasheath Cable.

Shutdowns caused by power failures usually entail significant losses; loss of labor during repair time . . . and in some cases, loss of goods in production. This is not to mention cost of repairs, both in labor and in cable. Many such power failures are the result of overloaded circuits—obsolete cables unable to handle the increased loads of today's stepped-up production, or the anticipated needs of tomorrow.

Is your plant's high-voltage electric power system limiting you? Make a careful check of it to find out. Then, if out-of-date or inadequate wiring is a problem, see your Anaconda distributor or the Man from Anaconda—about high-voltage butyl-insulated Anaconda Durasheath.*

High-voltage Anaconda Durasheath (5 kv and up) has been designed to give long life, dependable service. It is insulated with Anaconda Butyl (AB)—resistant to ozone, moisture, heat. Its tough neoprene jacket resists weather, soil conditions, abrasion and mechanical injury.

You can run Anaconda Durasheath from underground to overhead, and into ducts in one continuous run—without splicing. It is light, flexible, easy to handle, economically installed. For further information about Anaconda Durasheath write: Anaconda Wire & Cable Company, 25 Broadway, New York 4, N. Y.

*Trademark 59281

Durasheath has Anaconda Butyl (AB) rubber insulation for

- extra high resistance against ozone
- exceptional moisture resistance
- 22% more current-carrying capacity than 70 centigrade insulation

SEE THE MAN FROM

ANACONDA®

FOR BUTYL-INSULATED DURASHEATH

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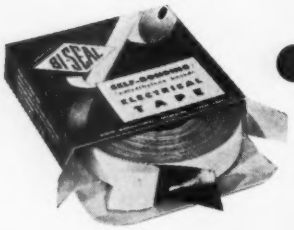

moisture sealing

BI-SEAL SELF-BONDING (polyethylene based) **ELECTRICAL TAPE**

Specified as the primary insulation for low and high voltage POLYETHYLENE insulated wire and cable. Low water absorption... low power factor... low dielectric constant. Operating temperatures from —40°C to 85°C.

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for Sealing, Splicing, Jacketing, Insulating

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NO. 125 ELECTRICAL FILLER TAPE

Fill voids rapidly with this ⅛" thick butyl-base insulating compound in tape form. Can be molded to any irregular shape or contour. Use for cable splice build-up... covering sharp-cornered connectors... padding bus bars... cable end sealing.

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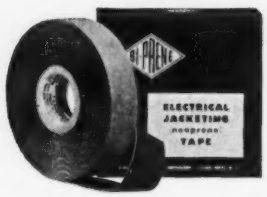
For splicing high voltage cables insulated with ozone-resistant compounds, and operating at 2000 volts or more. Fuses into moisture-proof wall that equals or betters the original insulation ... Operating temperatures from —40° to 85°C. Very low power factor and moisture absorption. Surpasses ASTM D-1373.



jacketing

BI-PRENE (neoprene) JACKETING TAPE

This self-fusing neoprene tape is intended particularly for use as a jacketing tape for neoprene sheathed cable. It is also recommended for covering service-entrance connections.

NEW! NEOFIL (neoprene) ELECTRICAL FILLER TAPE
⅛" thick tape — Insulates in one wrap — No covering tape needed!

GraybaR PRODUCTS OF QUALITY

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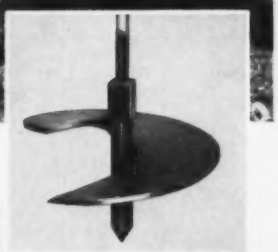

MECHANIZE SCREW ANCHOR INSTALLATION

Use your power hole-digging equipment to install Chance Screw Anchors in 5 to 8 man-minutes . . . *from the time the equipment is moved into place until the anchor is ready for the guy.*

Chance Power Installed Screw Anchors, ranging from 78 to 176 square inches in area, go down fast into all types of soil (except extremely rocky soil). The sharp cutting helix of high-strength structural steel is tapered to minimize earth disturbance. Hundreds of installations and pull tests prove these anchors hold more with less creep than any anchors of comparable size.

Your boring equipment can be easily adapted to power anchor installations by use of a special Chance wrench (right) which transmits torque from the power equipment directly to the hub on the anchor helix. Wrenches are made to fit all popular makes of earth borers. And, since the anchor rod is not subjected to torque, it only has to be heavy enough to support the guy load. That's a cost-saving factor. So, power-install Chance Screw Anchors, and get: lower installation costs per anchor • better utilization of expensive equipment • greater holding power with less creep • consistent results • elimination of human variables and error • less physical effort, better employee relations.

FOR "ALL 'ROUND" HOLDING POWER

CHANCE 8-way Expanding Anchors

It's not surprising that in every field test the Chance 8-way Expanding Anchor holds more than its rated load because its eight blades expand to form a pyramid shaped square—there is no wasted space between blades. The load is distributed evenly—all around the hole. It seems logical that it should hold more, and it does. That's why it's on so many company standards.

Available in sizes from 60 to 200 square inches in area, for distribution and transmission line guying.

THREE WAYS TO MAKE GOOD HOT LINE TAPS

Chance "P. C." AGP Tap Clamps for bi-metal connections or "P.C." AA for aluminum-to-aluminum

New Chance all aluminum tap clamps for heavy duty aluminum-to-aluminum taps in highly corrosive areas

Chance "P. C." CC Tap Clamps for copper-to-copper taps

CA60-25

A. B. CHANCE COMPANY

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(A. B. Chance Company of Canada, Ltd., Toronto)

ABC

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Graybar Everything Electrical

NOW! Fuses that...

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Limit fault current to very low values

Hold 500% load for minimum of ten seconds

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Protect Mains, Feeders, Branch Circuits, Motors, Controllers, Switches—no matter whether the fault current is 1,000 amperes, 25,000, 100,000—or as high as 200,000 amperes.

Reduce stresses and prevent damage to Panel-boards, Switches, Motor Controllers—other circuit components—because let-thru fault currents are limited to exceptionally low values.

Prevent work stoppages, lights out, waste of time and money—because long time-lag keeps them from opening needlessly on motor starting currents or other harmless overloads.

Permit increasing interrupting capacity and current limitation on present system at minimum cost.

Before designing a new installation— or modernizing old installations—

GET ALL THE FACTS

Knowledge without action is of little value—but ACTION NOW may save you money—increase operating efficiency and reduce electrical hazards to a minimum.

BUSS LOW-PEAK fuses fit standard Switches and Panel-boards and are available in N.E.C. sizes from 15 to 600 amperes in both 250 and 600 volt ranges.

Write for BUSS LOW-PEAK Bulletin Now . . . or use coupon.

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EW-660

HELP SAVE ON MAINTENANCE

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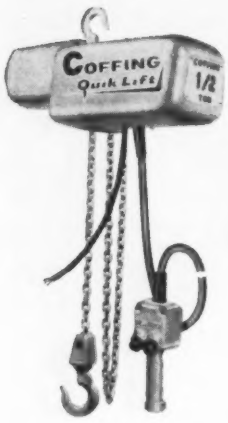
Coffing Hoists for Safety and Economy



Coffing Quik-Lift Electric Hoists

New coil chain line features push-button controls on all models. Made with lightweight aluminum castings, they are available in 20 models ranging from ¼ to 2 tons in capacity. For other lifting speeds and larger capacities, we offer the Quik-Lift Series "S".

Super Power Coil Chain Hoists

Compound lever and ratchet-and-pawl construction make them lightest, safest, most efficient hoists in their class. Six models in capacities from 1½ to 5 tons—1½ and 3 ton in aluminum as well as malleable iron.

Safety Pull Roller Chain Hoists

Ratchet-and-pawl construction assures safe operation, and "Safety Valve" handle gives before any load-bearing part can fail—warning operator. Ten models in capacities from 1½ to 15 tons.

Challenger Spur Gear Hoists

Light-weight and dependable, the Challenger is available in ½ and one ton capacities. Durable construction and sealed-in lubrication reduce maintenance costs to a minimum.

Mighty-Midget Pullers

Light and compact—500 pound model weighs but 6½ pounds, 1000 pound model but 9½. Handle can be used either as a lever or a high speed crank.

Duff-Norton Jacks Save Time, Energy and Money

Pole-Pulling Jacks

Duff-Norton pole-pulling jacks will pull or straighten utility poles without laborious digging. Hinged channel base permits jack operation at an angle or upright as required. Service need not be interrupted when these jacks are used.

Cable Reel Jacks (single action)

Jacks are equipped with adjustable cable reel lift incorporating a steel hook which can be placed at any point on the lifting rack. Reels of different diameters can be picked up at any height. Five ton model 524MCR is especially adaptable to warehouse use for handling cable, wire, hemp rope, leather belting and the like.

DUFF-NORTON

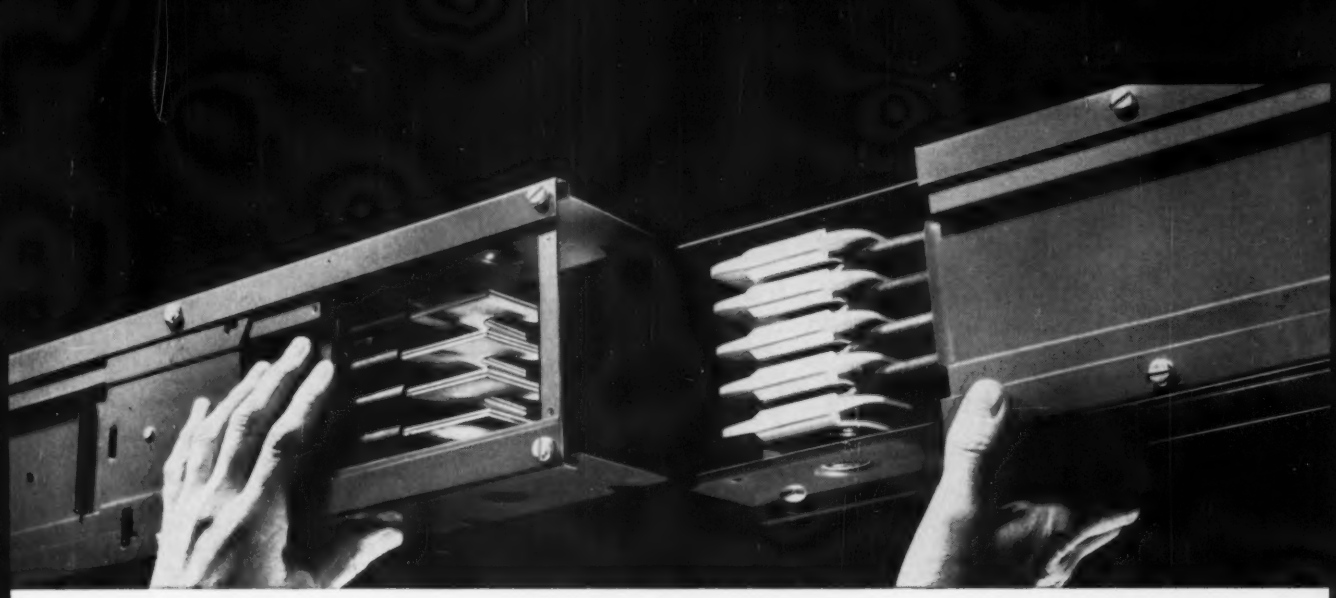
Duff-Norton Company

MAIN PLANT AND GENERAL OFFICES: PITTSBURGH 30, PA.

THE CANADIAN DUFF-NORTON COMPANY, LTD., TORONTO 6, ONT.

Coffing Hoist Division • DANVILLE, ILLINOIS

GraybaR PRODUCTS OF QUALITY



NEW BULLDOG XL BUSTRIBUTION DUCT

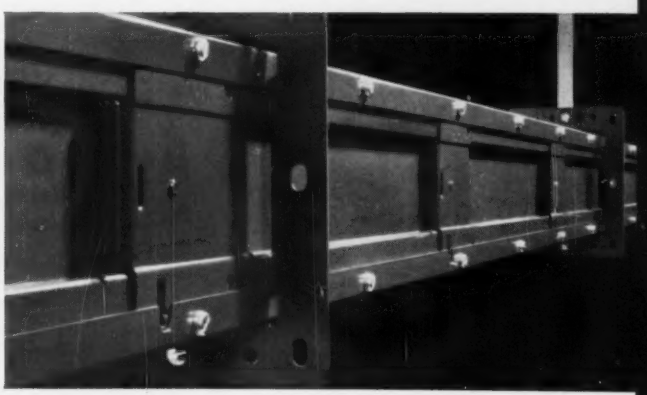
CUTS INSTALLATION TIME 3 WAYS

You can install XL BUStribution® Duct easier, faster than any other duct because of these exclusive new design features . . . plated aluminum bus bars with KEYED ENDS slip together fast, align automatically for proper position. There's no fumbling and fitting . . . ONE INTEGRAL BOLT tightens fast, locks joint positively under a ton of pressure. Bolt tightens against bus bar, not against the casing . . . TEN-FOOT SPANS take fewer hangers and less time to install than ordinary duct.

New XL BUStribution Duct is 3 ways safer, too. It's the only true dead-front duct, the only one with exclusive Safety Door, the only one with Safety Plug. And it reduces duct weight on building structure as much as 40%. Ask your BullDog distributor to arrange for a demonstration . . . you'll see how fast to install and how safe new XL BUStribution Duct really is.

BullDog Electric Products Division, I-T-E Circuit Breaker Company, Box 177, Detroit 32, Michigan. In Canada: 80 Clayson Rd., Toronto, Ont. Export Division: 13 East 40th St., New York 16, N.Y.

SINGLE INTEGRAL BOLT puts a ton of pressure on keyed bus ends. Joints lock tight *fast*, stay locked.



TEN-FOOT SPANS take fewer hangers and less time to install than ordinary duct.

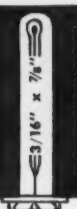
BULLDOG ELECTRIC PRODUCTS DIVISION
I-T-E CIRCUIT BREAKER COMPANY

KEEP PACE WITH ELECTRICITY

HELP SAVE ON MAINTENANCE

Everything Electrical

PRETESTED HOLDING POWER



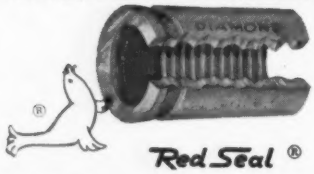
USE DIAMOND DHD® HAMMER DRIVE ANCHORS

WHERE HOLDING POWER COUNTS . . . USE THIS EXPANSIVE ANCHOR . . . for ALL KINDS of MASONRY

- Nail Type
- Vibration Proof
- Rust Proof

TRIAL OFFER: Write for catalog sheet and trial samples.

A few other DIAMOND ANCHORS



Machine Screw Anchors
Inexpensive Calking Anchor. Red fibre disc keeps dust out of threads. Sizes 10-24 & ¼"-20.

ANCHORS
For hollow walls or doors. 3 sizes using ¼" holes, 1 size using 5/16" hole. One piece construction.

Diamond "Spring" Toggle Bolts
Wings butt together, do not bear against bolt. Diameters ⅛" to ½", lengths from 2" to 6".

700 lbs.

DIAMOND EXPANSION BOLT CO., INC.
OAKWOOD, NEW JERSEY

GraybaR PRODUCTS OF QUALITY

Another Engineering Achievement

NEW TYPE A-PLUS SAFETY SWITCHES

Circuit Breaker Power Ratings Fusible Switch Interrupting Capacity... Give Multiple Protection

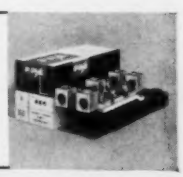
They're built like circuit breakers! These new switches stand at the head of their class in safety switch design. Get top marks in circuit protection with all these PLUS features:

Instantaneous contact action	PLUS	Visible blades for safety
High current carrying ratings	PLUS	High current interrupting capacities
Low maintenance cost	PLUS	Low initial cost
De-ionizing arc chutes	PLUS	Silver alloy contacts
Fingertip operation	PLUS	Large handle—clearly visible "ON"-"OFF"

There's a complete line of safest, coolest, heavy-duty Type A Switches from 30a to 1200a. See your authorized FPE distributor or write for Bulletin #1240. Federal Pacific Electric Company, General Offices: Dept. 460, Newark 1, New Jersey —The Best in Electrical Control, Distribution and Power Equipment.

COMMON SENSE NEUTRAL BARS

All switches 30A thru 200A have solid neutral blocks installed at no charge. On switches 400A thru 1200A, the neutral assembly is separately packaged for installation when required.

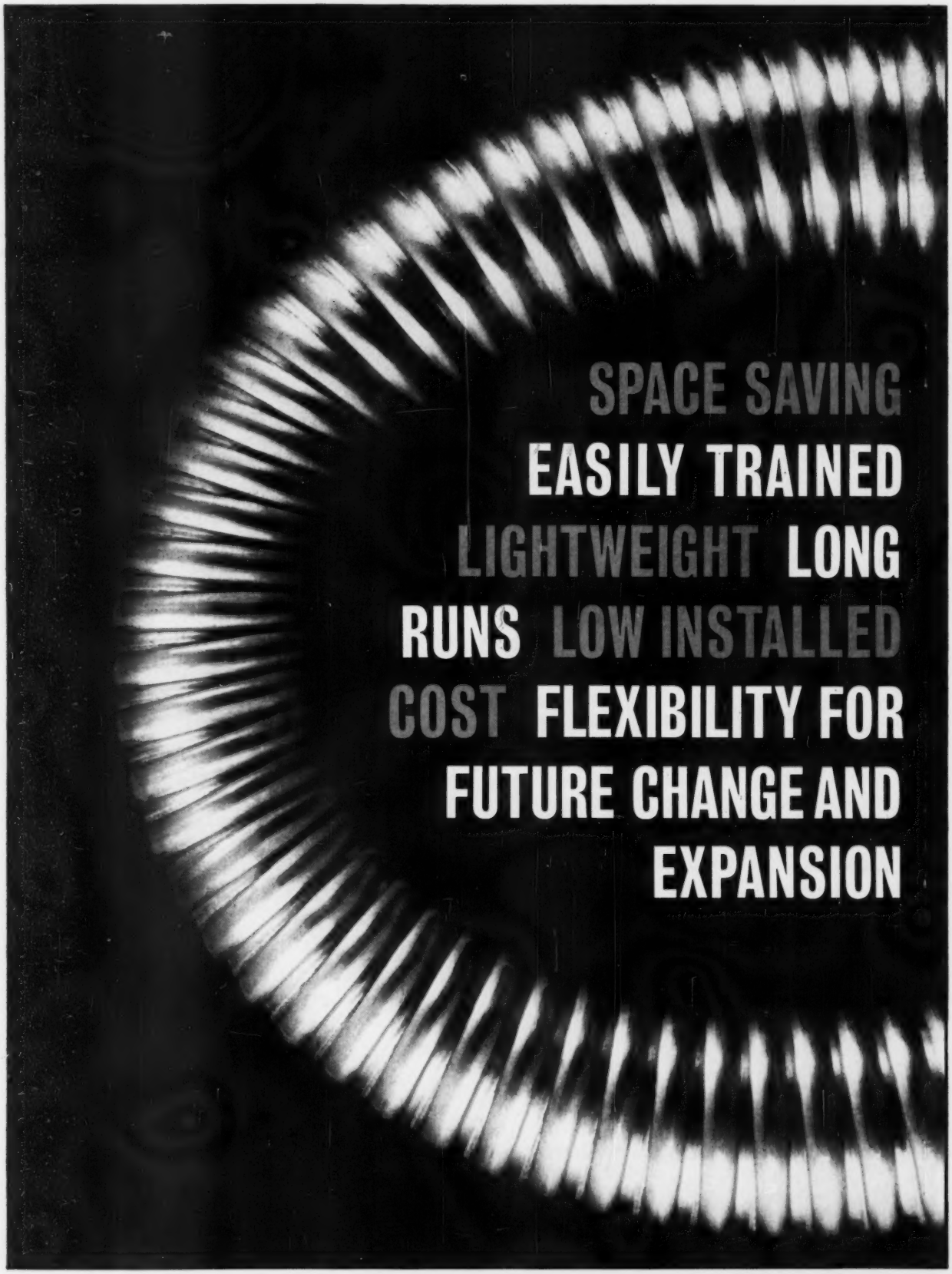


FPE **FEDERAL PACIFIC ELECTRIC COMPANY**

Affiliated with Cornell-Dubilier Electric Corporation

HELP SAVE ON MAINTENANCE

CUTLER-HAMMER Everything Electrical

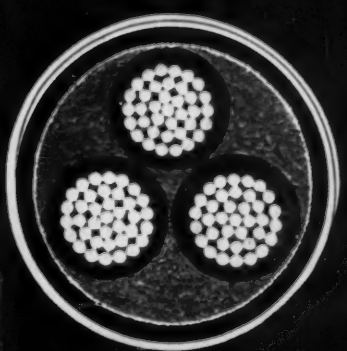


GraybaR PRODUCTS OF QUALITY

GENERAL CABLE

INTERLOCKED ARMORED CABLE

For full protection under all conditions install General Cable Interlocked Armor...the cable for power, control, communication and lighting systems. This compact, versatile cable is available in a wide range of constructions, insulations, armors and voltage ratings. Colored polyvinyl chloride jacket over the armor can be furnished where required. "How to Obtain the Greatest Advantage Per $ Spent" a comprehensive folder detailing General Cable's complete line of Interlocked Armored Cables is available upon request. **General Cable Corporation**, 730 Third Avenue, New York 17, New York. Offices and Distributing Centers Coast-to-Coast.



HELP SAVE ON MAINTENANCE

Everything Electrical

HUBBARD

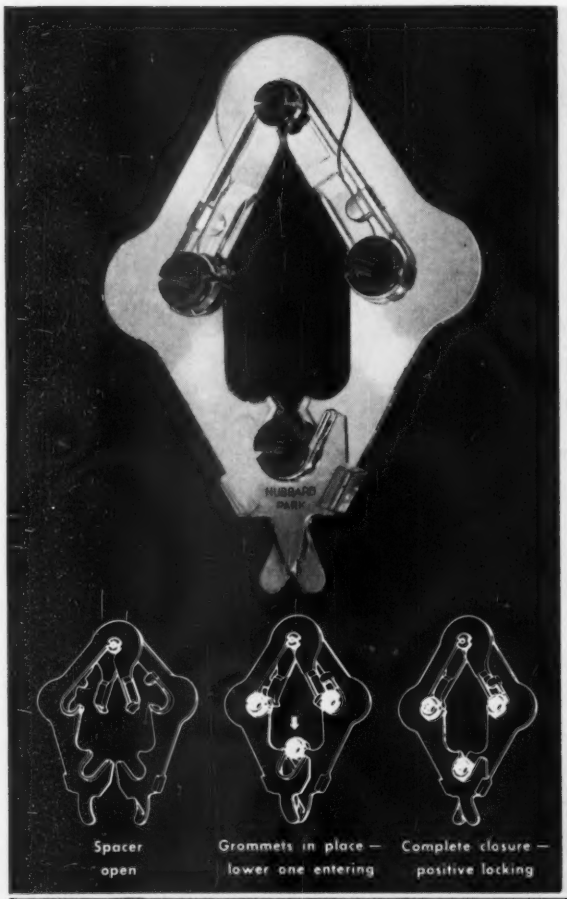
AERIAL CABLE HARDWARE AND SPACER

...perfect for all aerial cable systems

You can save money and time by installing Hubbard Aerial Cable Hardware if you are using aerial cable construction.

MONEY — because *without* the use of bolts, clamps, keepers or tie wires, Hubbard-Park Plexiglas spacers completely enclose and positively lock cables and messenger on 6-inch centers. Polyethylene grommets are available for all standard cable sizes.

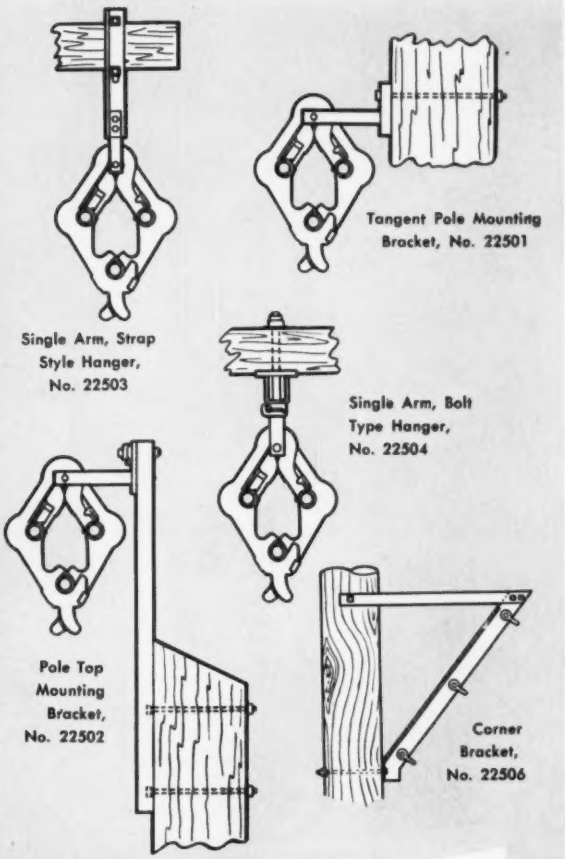
TIME — because Brackets and Spacers are easily and quickly installed and procured from the same source. Brackets are designed for any mounting conditions as shown by sketches at the right.



Spacer open

Grommets in place — lower one entering

Complete closure — positive locking



Tangent Pole Mounting Bracket, No. 22501

Single Arm, Strap Style Hanger, No. 22503

Single Arm, Bolt Type Hanger, No. 22504

Pole Top Mounting Bracket, No. 22502

Corner Bracket, No. 22506

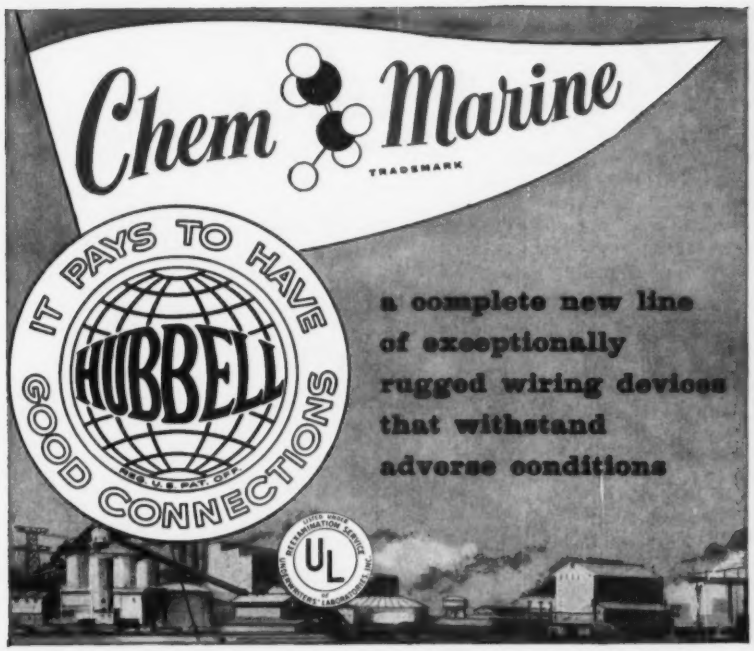
BETTER PRODUCTS *through Creative Engineering*

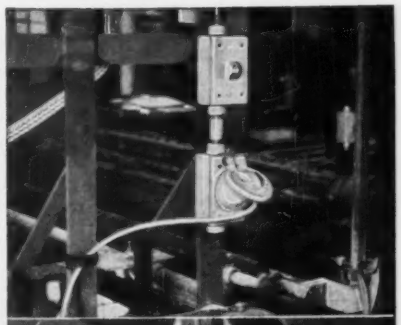
HUBBARD

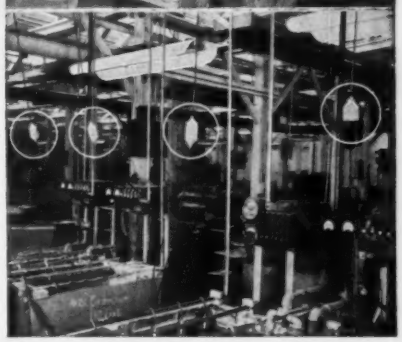
AND COMPANY · 200 SOUTH MICHIGAN AVENUE · CHICAGO 4, ILLINOIS

The complete line of Hubbard Aerial Cable Hardware is available from stock for immediate shipment.

GraybaR PRODUCTS OF QUALITY







RESISTS CORROSION

This new super line of "Chem Marine" devices are engineered from corrosion resistant materials capable of withstanding the harmful effects of moisture, brine, grease, oils and many acids. They are designed for industrial applications such as plating rooms, shipping platforms, yards, shops, warehouses, or wherever corrosion or chemical action is a problem.

Special Materials:

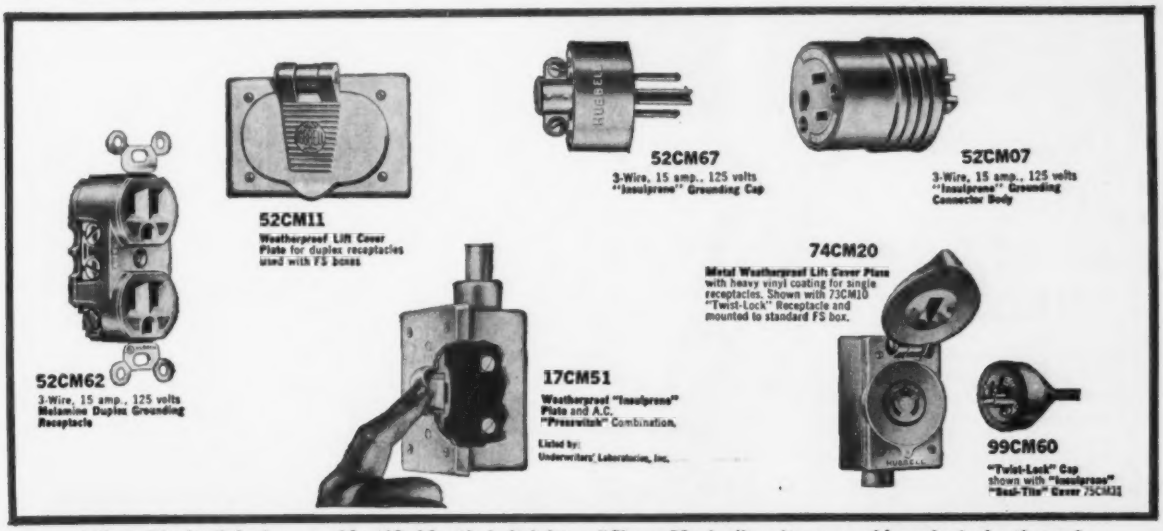
"INSULPRENE"—a Du Pont neoprene compound.

"MONEL® METAL"—Reg. Trademark of INCO.

"MELAMINE"

"CYMEL®"—Reg. Trademark of Am. Cyanamid

HEAVY NICKEL-PLATED CURRENT CARRYING PARTS.


52CM11
Weatherproof Lift Cover Plate for duplex receptacles used with FS boxes
52CM67
3-Wire, 15 amp., 125 volts "Insulprene" Grounding Cap
52CM07
3-Wire, 15 amp., 125 volts "Insulprene" Grounding Connector Body
74CM20
Metal Weatherproof Lift Cover Plate with heavy vinyl coating for single receptacles. Shown with 73CM10 "Twist-Lock" Receptacle and mounted to standard FS box.
52CM62
3-Wire, 15 amp., 125 volts Melamine Duplex Grounding Receptacle
17CM51
Weatherproof "Insulprene" Plate and A.C. "Pressvitch" Combination.
Listed by: Underwriters' Laboratories, Inc.
99CM60
"Twist-Lock" Cap shown with "Insulprene" "Seal-Tite" Cover 75CM31

"Chem Marine" devices are identified by their bright yellow color and a few representative items are illustrated above. "Chem Marine" is supplied in a wide variety of "Twist-Lock" and grounding devices to fit any industrial or marine application.

"Chem Marine" units are sold exclusively through authorized Hubbell distributors. For complete information write the "Chem Marine" Department of Harvey Hubbell, Incorporated.

HARVEY HUBBELL, INCORPORATED

BRIDGEPORT 2, CONNECTICUT *The finest in rugged wiring devices since* 1888.

HELP SAVE ON MAINTENANCE

Everything Electrical

IT'S PERFORMANCE THAT COUNTS
One piece of galvanized steel strand may look much like any other BUT there can be a marked difference in performance.
That is why it is so important where overall construction costs are high (compared with the cost of the strand itself) to obtain the best strand available for a specific job.
More than 50 years of specialized skill and experience go into every coil and reel of Crapo Galvanized Steel Strand. Each size and grade is produced from selected steel, processed under laboratory supervision and galvanized by the dependable Crapo Process to meet the demands of the service for which it is intended.
Both individual wires and finished strand undergo rigid laboratory tests to make certain that the final product conforms to highest standards and specifications.
Thus you can be sure, when you specify Crapo Galvanized Steel Strand for guys, messenger or overhead ground wire, that you are getting a consistently high quality product which will give you the utmost in performance.
Crapo
GALVANIZED
STEEL
STRAND
SPECIALIZING
IN STRAND
FOR THE
UTILITIES . . .
Our engineering, manufacturing and testing facilities are geared to the production of quality steel strand for the power and communication industries. If you have a problem involving the use of steel strand in overhead lines, ask your Graybar representative for pertinent technical information!
INDIANA
Crapo Galvanized Steel Strand is available in all standard sizes and grades and in Class A, B and C Coatings.

GraybaR PRODUCTS OF QUALITY

ILG

VIBRATION-FREE

as a fan can be

Put a Pilsner on any Ilg propeller fan (as we did on this 42″ model), flip the switch so the fan runs at full speed, and we defy you to find any bubbles in the beer due to vibration.

It runs so smoothly!

At Ilg, careful dynamic balancing of all component parts, and electronic checks of motor and wheels—both before and after assembly — guarantee that smooth and silent operation is as much a part of every propeller fan as the "One-Name-Plate" pledge of performance. And at Ilg that means every fan will last through the years—*without expensive maintenance!*

Follow the Flame and see why Ilg direct-connected propeller fans always run cool. In this unretouched photo, you can see how the vent pipe sucks in outside air to *pressure-cool* permanently lubricated Ilg-built motors, both the single-phase permanent-split capacitor and 3-phase types. Ilg gives you cost operating advantages of *open-type* motors with the protection of *totally enclosed* types. No motor lasts longer.

ILG

®

ILG ELECTRIC VENTILATING CO.

2885 N. Pulaski Road, Chicago 41, Illinois

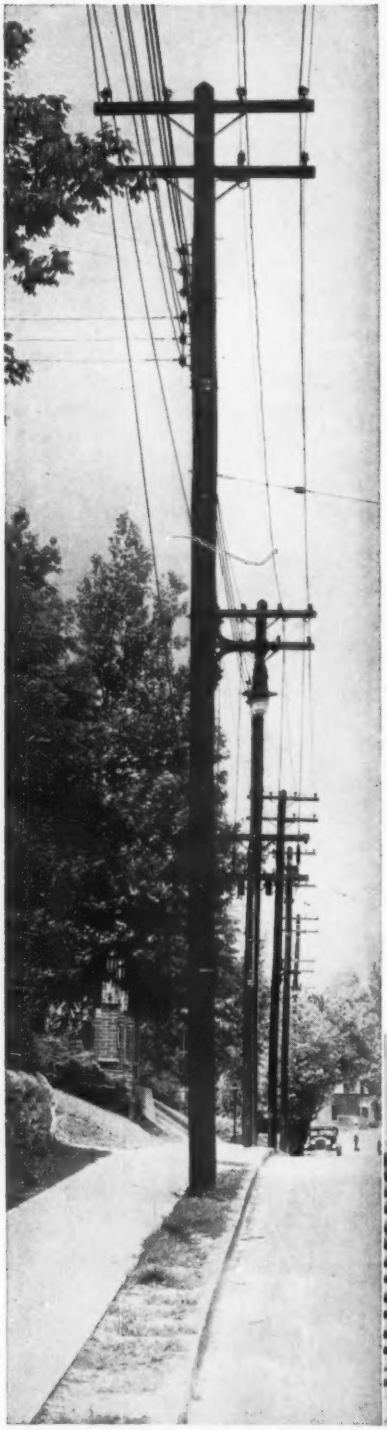
Offices in more than 57 principal cities

Member of Air Moving and Conditioning Association Inc. (AMCA)

HELP SAVE ON MAINTENANCE

Graybar Everything Electrical

DEPENDABLE



Poles

of Selected Sound Timber Scientifically Treated

THE lasting strength of International Creosoted Pine Poles plus their low ultimate cost makes them the safest and most economical poles that can be purchased. For more than 85 years, numerous service records of pole treatments have been utilized to perfect the present production practices for International Creosoted Poles. As a result of the lessons learned during this long experience, International Creosoted Poles will assure trouble-free, continuous service. Their straight, clean, smooth surfaces perfectly adapt them for street lighting, rural and urban distribution.

International Creosoted Pine Poles are manufactured and distributed by two of the oldest companies serving the utility industry. They have grown up together, ready always to serve with quality poles, framed correctly, and shipped when needed.

INTERNATIONAL CREOSOTING & CONSTRUCTION CO.

PRODUCERS OF HIGH GRADE TREATED TIES, POLES, PILES, ETC.

Galveston — Beaumont — Texarkana

GraybaR PRODUCTS OF QUALITY

201—famous Klein Side Cutting Plier. Sizes 5, 6, 7, 8 and 9 in.

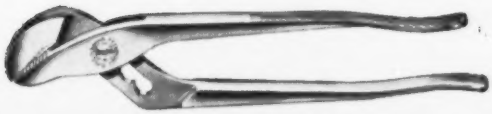
201-NE—rounded nose side cutting plier. Sizes 5, 6, 7, 8 and 9 in.

213-9NE—high leverage plier. Will cut regular and weatherproof hard drawn copper wire up to No. 2.

301—long nose plier. Available in 5-, 6- and 7-in. sizes. Also may be had with cutters.

202—narrow nose oblique cutting plier. Available in 5- and 6-in. sizes.

500—adjustable wrenches. 6, 8, 10, 12 in.



510—pump plier. One hand operation. Length, 9½ in.

KLEIN TOOLS EST. 1857

over a century of progress

Klein has been the leading supplier of tools and equipment to the electrical industry since the first wires were strung. It was over 100 years ago that Mathias Klein first opened his little forge shop in Chicago. Today the name Klein is known for quality the world over. From your Electrical Distributor, you can secure anything you need in tools and equipment for linemen and electricians. Below are a few of the popular Klein items available.

5249—lineman's belt. Full floating with "Klein-Kord" sliding trace. One of a complete line.

5294—"Klein-Kord" nylon safety strap made of multiple plies of strong, woven nylon bonded with frictioning and vulcanized in neoprene.

1628-3—an improved grip for messenger guy strand and conductors up to ½-in. diameter. Wide range of other styles.

1959-AR—replaceable Gaff climber; right and left, adjustable from 14½ to 19 in. Other designs available.

This new Klein Catalog is just off the press. A copy will be sent to anyone interested on request.

Mathias KLEIN & Sons
Established 1857 — Chicago, Ill., U.S.A.
7200 McCORMICK ROAD • CHICAGO 45, ILLINOIS

HELP SAVE ON MAINTENANCE

GRAYBAR Everything Electrical

NOW! LOOK HOW MUCH YOU SAVE BY SWITCHING FROM COPPER TO ALUMINUM SE-U!

COST COMPARISON—ALUMINUM VS. COPPER

Service Entrance Cable
Concentric Uninsulated Full Neutral, Braid Jacketed
Underwriters' Type SE, Style U, 75° C. Operation

SERVICE		ALUMINUM		COPPER		SAVINGS WITH ALUMINUM	
Amperes	Feet	Conductor Size AWG	Cable Cost $	Conductor Size AWG	Cable Cost $	$	%
100	20	2	7.58	3	13.20	**5.62**	**42**
.....	40	2	15.16	3	26.40	**11.24**	**42**
.....	60	2	22.74	3	39.60	**16.86**	**42**
150	20	2/0	13.00	1/0	30.80	**17.80**	**58**

NOTE: Based on prices in effect as of May 1, 1960.

Check the table . . . at today's prices, braided aluminum SE-U saves you money over copper right down the line!

Note that the cost of #2 aluminum SE-U is 42% *lower* than #3 copper SE-U. With the trend toward larger sizes, savings with aluminum become even greater—up to 58% for 150 ampere service! Neoprene jacketed aluminum cables offer similar savings.

FREE BROCHURE GIVES YOU THE FACTS

Our free brochure, *"KW Service Entrance Cable,"* points out the distinctive characteristics of both braided and neoprene jacketed aluminum cable, and fully explains why this cable offers definite advantages over copper.

It also describes and illustrates applications of SE-U Cable, as well as Single Conductor in Conduit, and contains a list of manufacturers of accessories for both applications.

Get your free copy of this informative 8-page brochure now. Mail the coupon!

KAISER ALUMINUM

IF IT CARRIES CURRENT, KW CARRIES IT!

Kaiser Aluminum & Chemical Sales, Inc.
Kaiser Center, 300 Lakeside Drive
Oakland 12, Calif.

Please send your free brochure,
"KW Service Entrance Cable."

Name_____

Address_____

City_____ State_____

GraybaR PRODUCTS OF QUALITY

It Pays to have the Right Equipment

Distributed by GraybaR ELECTRIC COMPANY

OSHKOSH

POLE LINE TOOLS

BEACH COMPANY • OSHKOSH, WISCONSIN

Since 1857

NEW PRODUCTS:

Skidding Tongs

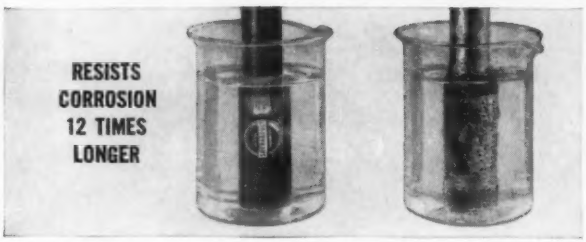
Alley Arm Ladders

Combination Reels for Aluminum

HELP SAVE ON MAINTENANCE

GraybaR Everything Electrical

NEW! BETTER! BEST! FROM NATIONAL ELECTRIC!

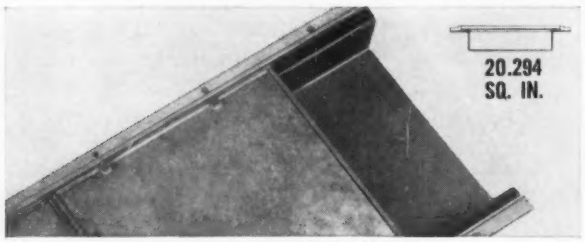


SHERARDUCT RIGID CONDUIT

Acid bath torture test proves superiority. Double protection: It's Sherardized (exclusive zinc process to galvanize in *depth*)! It's coated inside and out with MVC-1 (exclusive polyvinyl chloride resin that lasts and lasts)!

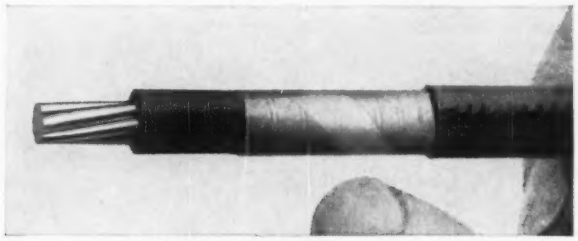
XDUCT JUNIOR

Quality control eliminates splits and high seams. E.M.T. with automated electronically-inspected production. Electrogalvanized outside surface. Easy fishing. Superior bending. Silvery color.



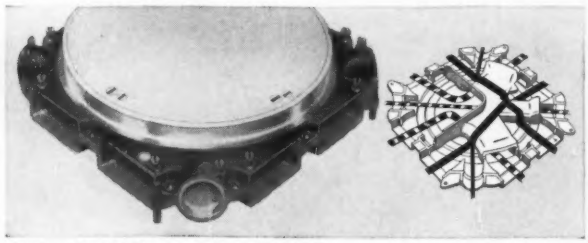
NEW! 15,000 SERIES HEADERDUCT

Largest available capacity. A full 20.294 square inches of wiring area. Provides 100% accessibility to any or all cells in cellular steel floors. Handles largest phone cables. A complete system for cellular floor construction.



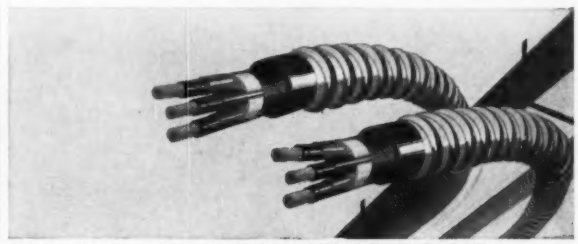
MYLAR* TAPED BUILDING WIRE

Four times the abrasion resistance of rubber-filled tape. Highly resistant to flexing. High dielectric strength. Withstands action of acids, alkalies, moisture, and oxidation. Smaller diameter. *Dupont "Mylar".



NEPCODUCT

New junction box is quickly brought into alignment with finished floor even after concrete has set. Leveling adjustment can be made with screwdriver without removing cover plate. Lazy susan interior partition can be relocated in case box should be inadvertently installed in incorrect position.



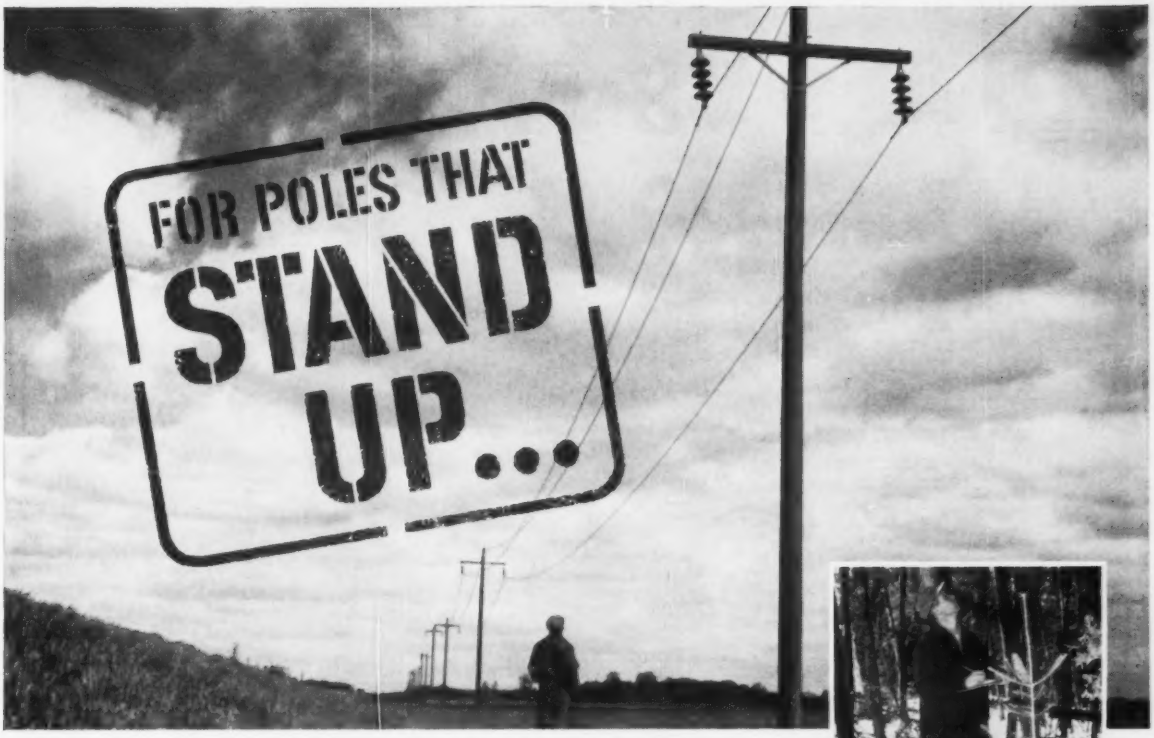
NEPCO-LOK INTERLOCKED ARMORED CABLE

Outstanding flexibility cuts installation costs. Installed quickly around corners and projections. Economically relocated for changing power needs of the future. 600-5,000 or 15,000 volt . . . one, two, three, four conductor and control cable assemblies.

NATIONAL ELECTRIC DIVISION PORTER **H.K. PORTER COMPANY, INC.**

PORTER SERVES INDUSTRY with steel, rubber and friction products, asbestos textiles, high voltage electrical equipment, electrical wire and cable, wiring systems, motors, fans, blowers, specialty alloys, paints, refractories, tools, forgings and pipe fittings, roll formings and stampings, wire rope and strand.

GraybaR PRODUCTS OF QUALITY



Controlled Growth

Specify Western Red Cedar and Northern White Cedar from NATIONAL POLE!

THE TOTAL LOAD that your poles must carry is far, far more than just the weight of the lines. Installation, inspection and maintenance cost big money. And service failures may cost a fortune. So the great need, of course, is for poles that *stand up* . . . for years and years and years to come.

Unless you have a crystal ball for looking into the future, your best assurance of pole performance is to choose a supplier you can trust, and *wood species* you can trust.

So put your faith in Graybar . . . and National Pole . . . and Western Red Cedar or Northern White Cedar. At the huge, modern National Pole treating plant, only the finest selected timber goes into processing. It is always cut and handled with care . . . slowly, thoroughly seasoned . . . incised, drilled and framed to precise perfection . . . and then pressure penta-treated by the newest, finest methods.

Here is a sensible investment in safety and satisfaction. On your next pole purchase, get *cedar* by *National Pole* . . . through *Graybar!*

NATIONAL POLE

National Pole and Treating Division
Minnesota & Ontario Paper Company
INVESTORS BUILDING—MINNEAPOLIS 2, MINNESOTA — *Telephone* FE*deral* 8-8881
Branch Office: Prudential Building, Chicago, Ill.
Plant: Minneapolis, Minnesota

Controlled Cutting

Controlled Seasoning

Controlled Treating

Controlled Fabrication

HELP SAVE ON MAINTENANCE

Graybar Everything Electrical

sure they're all designed by the same company (O·B, of course)

Here is a sample of insulator and hardware items for distribution lines made by Ohio Brass. There are dozens more to choose from. Suspension clamps . . . fittings . . . strain yokes . . . pintype, post and suspension insulators. You name what you need; O-B has it. Then you're sure the units will work together at the pole top . . . because they were designed together in our plant.

And every item in O-B's long list of distribution materials is easy to order. Just call Graybar. Close teamwork between O-B and Graybar assures you that your insulators and hardware will be on the spot when you need them . . . certainly another good reason for always specifying O-B products.

Ohio Brass ® HOLAN

These products distributed by GraybaR ELECTRIC COMPANY

10042-H

GraybaR PRODUCTS OF QUALITY

NEW

*Orangeburg Standard Conduit with Flush Coupling Attached at Factory . . . No Extra Cost!

JOINS 26% FASTER

Because there are no separate couplings to assemble on the job, Orangeburg's new CA Conduit lays faster—costs less to install. In addition, there are no coupling cartons to handle, transport or store.

Orangeburg's new CA Conduit comes, at *no extra cost*, with a factory-attached coupling at one end and a standard 2° male taper at the other end. To join—CA's long, lightweight lengths are placed end to end—hammered home in a simple, one-step operation. Actual installations *prove* Orangeburg's new CA Conduit joins up to 26% faster!

What's more, because the attached coupling is *flush* with the outside diameter of the conduit, new CA Conduit is easy to handle and store in neat, even stacks. And with the new flush coupling there's no need to "stagger" conduit joints in the trench. That means less cutting and tooling time.

New CA Conduit—like the millions of feet of Orangeburg Fibre Conduit in use since 1893—has self-sealing joints and impermeable walls that make it absolutely watertight. Its smooth 100% fibre raceway adds years to cable life.

Specify new CA Conduit on your next job. This addition to Orangeburg's line is available in 2", 3", 3½", 4", 4½" and 5" sizes. Orangeburg's Standard and Nocrete Conduit with separate sleeve couplings are available as always. Orangeburg Manufacturing Co., Orangeburg, N. Y.

ORANGEBURG MANUFACTURING CO.
Division of The Flintkote Company, Manufacturer of America's Broadest Line of Building Products

FLINTKOTE

HELP SAVE ON MAINTENANCE

Crayblak Everything Electrical

You can save money on inventory with Graybar as your auxiliary warehouse

Use Graybar as your auxiliary warehouse and you can shorten your stock on most electrical equipment and supplies. Graybar stock designed for utility use is near at hand, wide in range, and large enough for any contingency.

This means that you can materially lower either the interest charges on inventory or the cash investment you have in it.

Other savings: you can reduce losses on surplus, on obsolescence, on equipment damaged in receiving and storing.

Start with a local call . . . Why not consult with your Graybar salesman and discuss a specific plan based on your system needs?

Employee-owned Graybar, a part of your local community, has served utilities continuously since the first lines went up. Whether you require 3 items or 3,000, Graybar is your most practical source for most electrical utility equipment and supplies.

When Graybar is your auxiliary warehouse—	You save on storeroom costs Reduce inventory investment Insure prompt delivery Step up man-hour efficiency Simplify bookkeeping

932

GraybaR

ELECTRIC COMPANY, INC.

420 Lexington Avenue, New York 17, N.Y.

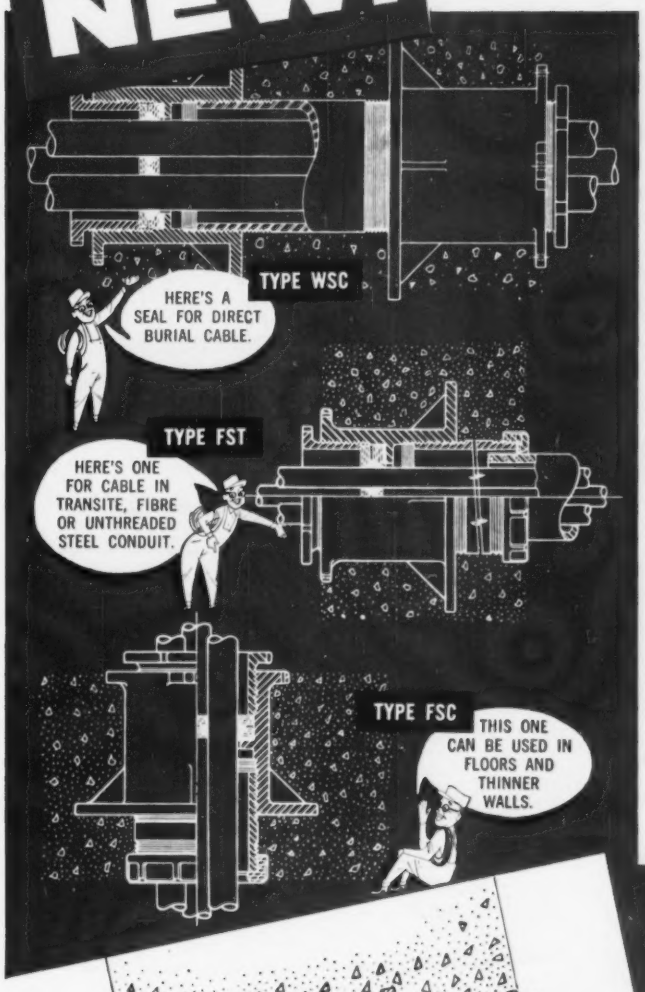
Everything Electrical GraybaR ELECTRIC COMPANY

IN OVER 130 PRINCIPAL CITIES

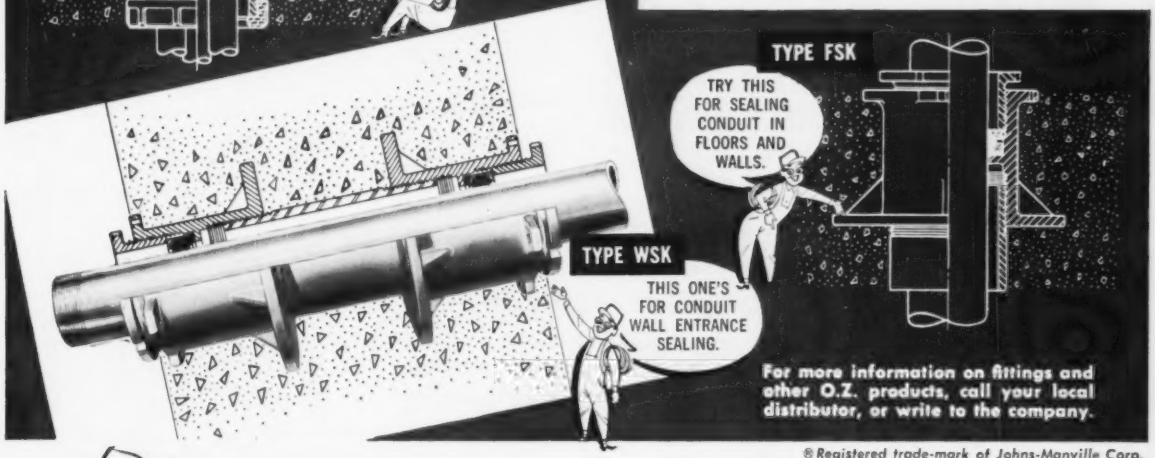
LOCAL SERVICE TO UTILITIES THROUGH COAST-TO-COAST WAREHOUSING

GraybaR PRODUCTS OF QUALITY

NEW! a complete line of O.Z. WATERTIGHT ENTRANCE FITTINGS for Conduit or Cable


TYPE WSC
HERE'S A SEAL FOR DIRECT BURIAL CABLE.
TYPE FST
HERE'S ONE FOR CABLE IN TRANSITE, FIBRE OR UNTHREADED STEEL CONDUIT.
TYPE FSC
THIS ONE CAN BE USED IN FLOORS AND THINNER WALLS.

End leakage problems once and for all! O.Z.'s new wall and floor entrance fittings for installation in concrete provide a positively watertight seal around conduit or cable at any pass-through point! Use them with threaded or unthreaded steel conduit, fibre or Transite® conduit, or exposed cables of varying number and sizes. Gland-type sealing assemblies, with pressure bushings, may be tightened at any time. Fittings accommodate conduit ranging from ¾" to 6". Standard types, sizes available from stock. Specials made to order.



For more information on fittings and other O.Z. products, call your local distributor, or write to the company.

® Registered trade-mark of Johns-Manville Corp.

O.Z. ELECTRICAL MANUFACTURING CO., INC.

262 BOND STREET • BROOKLYN 17, N. Y.

- CAST IRON BOXES
- CABLE TERMINATORS
- POWER CONNECTORS
- SOLDERLESS CONNECTORS
- GROUNDING DEVICES
- CONDUIT FITTINGS
- INTERLOCKED ARMOR CABLE FITTINGS

Sales Office and Warehouse: 406 So. Cicero Avenue, Chicago 44, Ill. • ESterbrook 9-0326
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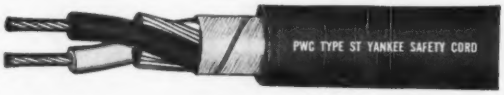
HELP SAVE ON MAINTENANCE

Everything Electrical

PWC INSULATED WIRES, CABLES AND CORD SETS

BUS DROP CABLE
Flexible and extensible branch circuits for machine shops.



TYPE ST YANKEE SAFETY CORD
UL listed Type ST and SJT in Safety Yellow.

STATION CONTROL CABLE
Conforms to IPCEA Standards, column "B" insulation.

PARALLEL POWER AND MINE CABLE
Listed by U. S. and Penna. Bureau of Mines.

TYPE ST FLEXIBLE POWER CABLE
Conforms to IPCEA and U.L. for 600 volt cables.

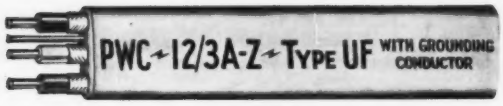
APPLIANCE WIRING MATERIAL
90° and 105°C Underwriters' Laboratories listed.

GASOLINE AND OIL RESISTANT WIRE
UL approved—sizes #14 to 500 MCM.

TYPE ST OIL-PROOF
UL listed Oil Proof Type ST and SJT.

IMSA CONTROL CABLE
Conforms to IMSA Specifications 19 and 20—1956.

INSIDE TELEPHONE CABLE
Commercial establishments and special plan wiring systems.



A-Z TYPE UF
Single conductor No. 14 to No. 4/0 Multiple conductor No. 14 to No. 6.

FLEXIBLE CABLE
Conforms to UL and IPCEA Standard.

RANGE AND DRYER CORD SET
Underwriters' Laboratories listed.

EXTENSION CORD SET
Safety yellow for portable tools, outside lights and power.

For additional information and special construction contact the PWC General Office.

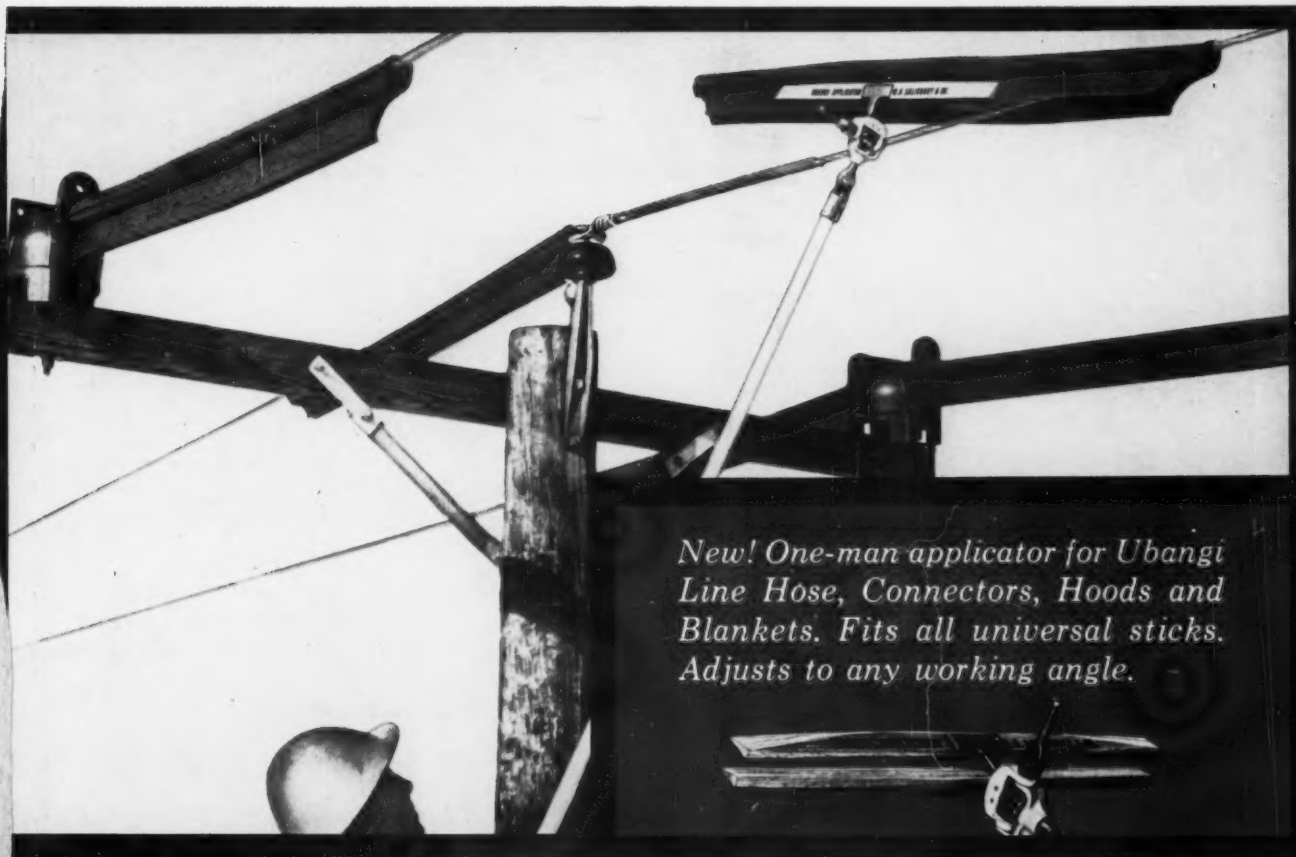
THE PLASTIC WIRE & CABLE CORPORATION

JEWETT CITY, CONNECTICUT

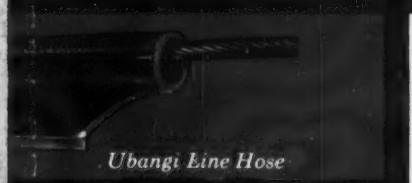
GraybaR PRODUCTS OF QUALITY

PROTECT LINEMEN WITH SALISBURY UBANGI SYSTEM!

NEW one-man application with hot line sticks

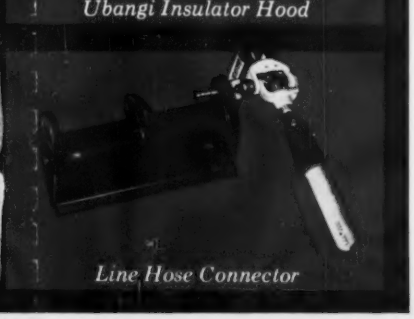


New! One-man applicator for Ubangi Line Hose, Connectors, Hoods and Blankets. Fits all universal sticks. Adjusts to any working angle.



Ubangi Line Hose

Ubangi Insulator Hood



Line Hose Connector

Ubangi System is Flexible... Economical
Non-Breakable...
Easily Stored... Corona Resistant

The trend toward higher distribution voltages creates a demand for special protective equipment to provide linemen temporary insulation against contact with energized circuits. Salisbury's Ubangi System, of new Salcor compound with Hypalon synthetic rubber, provides the dielectric strength, corona resistance and flexibility to meet this need. Lock Lap lips prevent accidental dislodgement of line hose. Rip-Grip construction securely fastens hose to insulator hoods and connectors. New applicator permits one-man installation of hose, connectors, hoods and corona-resisting blankets.

Write for descriptive literature and test values.

THE WORLD'S LARGEST MANUFACTURER OF LINEMEN'S RUBBER PROTECTIVE EQUIPMENT

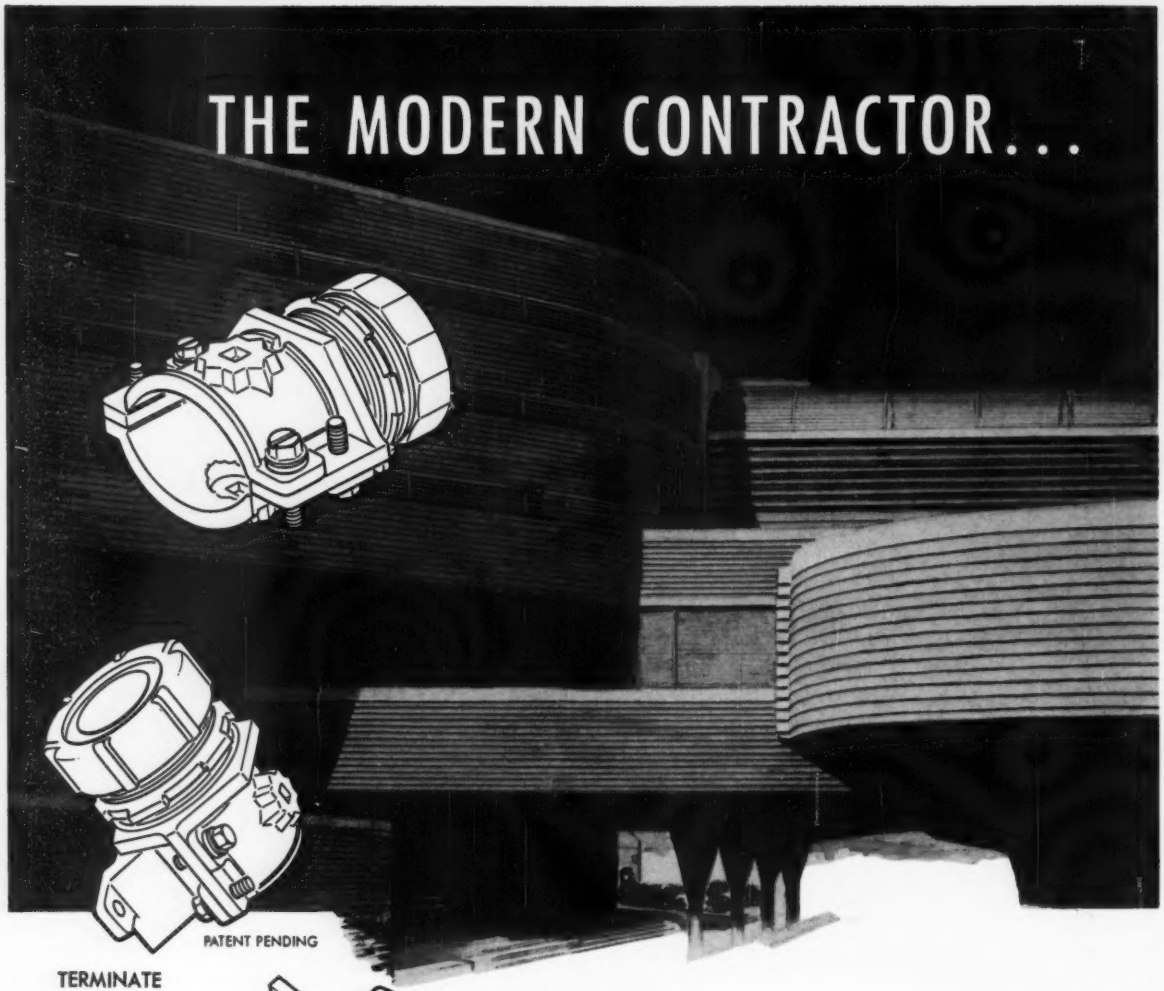
W. H. SALISBURY & CO.

401 N. Morgan Street • Chicago 22, Illinois

HELP SAVE ON MAINTENANCE

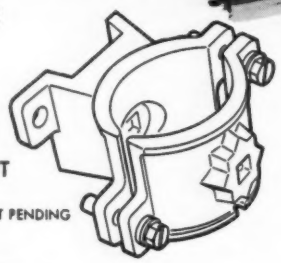
Graybar Everything Electrical

THE MODERN CONTRACTOR...



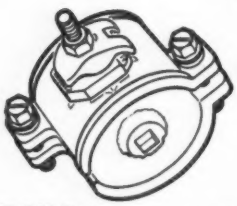
PATENT PENDING

TERMINATE



MOUNT

PATENT PENDING



SUPPORT

PATENT PENDING

GROUND

PATENT PENDING

USES THE...
T&B MODULAR FITTINGS SYSTEM FOR INTERLOCKED ARMORED CABLE

...to Fully Take Advantage of its Flexibility

With the Modular Fittings System you specify the fitting to suit the installation. Terminate, Dead End, Support, Ground, Mount, Pot Head, Wet or Dry, T&B Modular Fittings can solve all these problems, at Lowest Installed Cost.

Write for our Free Eye-Opener Series and learn how you may profit from this new System.

T&B ENGINEERED

SOLD COAST TO COAST EXCLUSIVELY BY YOUR LOCAL T&B DISTRIBUTOR

THE THOMAS & BETTS CO.

INCORPORATED

ELIZABETH, NEW JERSEY IN CANADA, THOMAS & BETTS LTD. MONTREAL

GraybaR PRODUCTS OF QUALITY

the new Roovers®

MIDGIE *Matic*

MAGAZINE LOAD

portable hand embosser

No need to thread hard-to-handle rolls of tape . . . just insert the MIDGIE MATIC magazine . . . dial . . . emboss . . . and, in seconds, your finished labels are cut to size, ready for use. No need to use an entire roll . . . you can change color or material . . . in a flash . . . at any time! No waste in tape or time!

The new Roovers MIDGIE MATIC Labeler is a precision-made, heavy-duty instrument, only 10½" long, chrome plated for beauty and resistance to wear. Engineered to give you years of efficient, trouble-free service. Embossing dies produce sharp, legible raised *letters and numerals* on a wide variety of pressure-sensitive plastic and metal tapes. Built-in cut-off blade cuts finished labels to exact length required, quickly and easily.

LIST **$47.00**

- **The <u>only</u> Magazine Load Labeler in the world . . . you can change color or tape in a flash . . . prevents accidental unwinding of tapes.**
- **Exclusive Roovers built-in hole puncher for easy mounting.**
- **High legibility . . . permanently raised contrasting characters, 5/32" type size, stand out against bright colored plastic background.**
- **10-day money-back guarantee if not satisfied. Warranted against any mechanical defects for one full year from date of purchase.**

Write today for complete details on the New Roovers MIDGIE MATIC Labeler and FREE CONVERSION OFFER.

FREE conversion offer

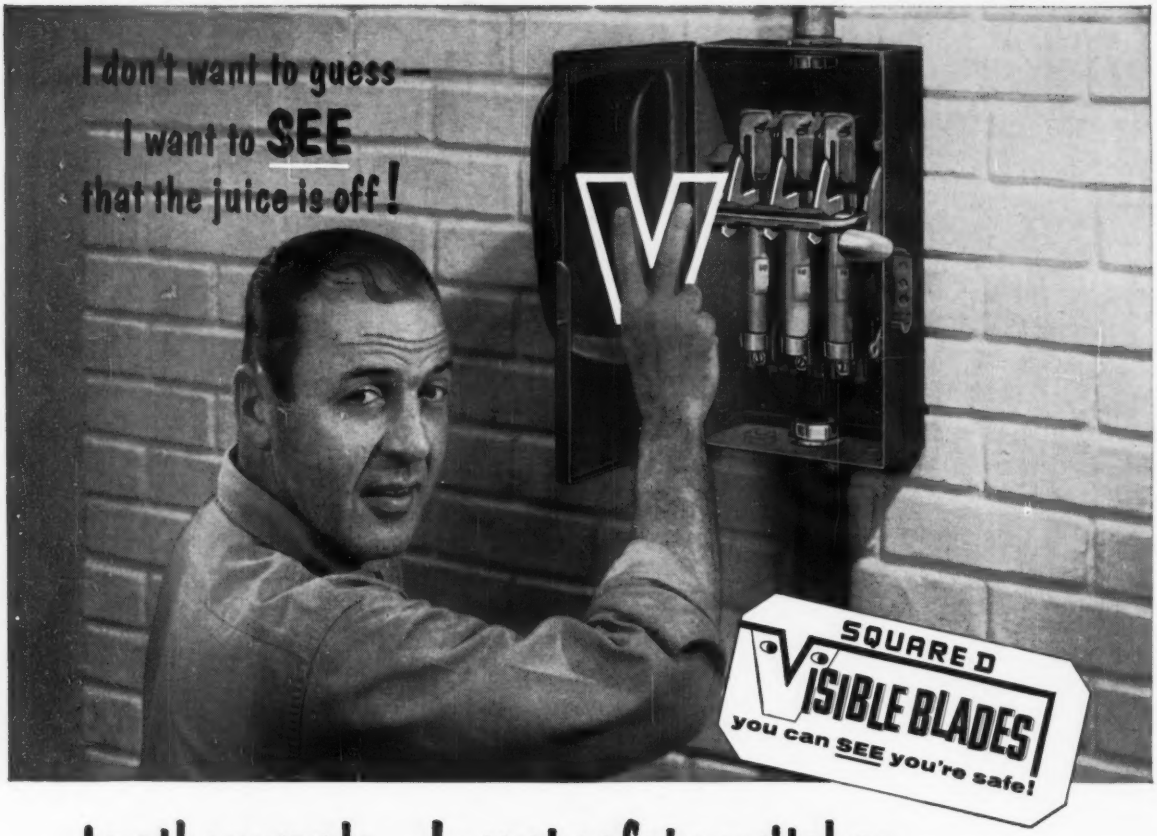
ROOVERS MAGAZINE LOAD
PLASTIC OR METAL
PRESSURE SENSITIVE TAPES

Permanent identification for all types of dials, controls, and gauges.

Easy-to-read, durable labels for greater efficiency in panelboards.

ROOVERS-LOTSCH CORPORATION
Old Forge, Pennsylvania

Graybar Everything Electrical



...in other words—I want safety switches with VISIBLE BLADES!

The men who pull the switches will tell you what can happen when a switch, *believed* to be open—*isn't.* A lot of things can happen—and every one of them is bad. Personnel is in danger. Motors can single-phase. Machinery and work can be damaged. Down-time can skyrocket.

Doesn't it make sense to insist on Visible Blade construction which gives you a road block against any of these possibilities? Doesn't it make equally good sense to insist on the safety switch which gives you that construction—plus a lot of other performance advantages?

100,000-ampere SHORT CIRCUIT Capacity —*Another Plus Feature*

Square D safety switches equipped with high capacity current limiting fuses provide full protection on even the highest electrical loads. Independent tests by a high capacity laboratory on Square D safety switches — rated at 30 through 600 amperes—subjected the switches to both open and closed tests on 100,000 ampere short-circuited systems. *Not one Square D switch showed any sign of failure!* Further proof that Square D switches provide *plus* safety. They cost no more—why settle for less?

SAFETY SWITCHES and other Square D products are distributed by GRAYBAR

SQUARE D COMPANY

GraybaR PRODUCTS OF QUALITY

Simplex PRODUCTS GUIDE

SIMPLEX WIRE & CABLE CO.
CAMBRIDGE 39, MASS., U. S. A.

Simplex ANHYDREX Insulated Cables for Power transmission and Communication (like the Simplex TIREX Portable Cords and Cables shown in adjacent column), though manufactured as stock products, are custom designed to suit all service requirements. A large technical and engineering staff at Simplex' main plant is equipped to give you the benefits of their long experience in electrical cable planning.

ANHYDROPRENE — Simplex ANHYDROPRENE Cables are designed for economical installation in ducts, conduits, racks, trays and raceways. Stock sizes AWG 14 to 1000 MCM are recommended for 90 C service in WET or DRY locations. The words "Simplex ANHYDROPRENE" are either printed or molded plainly on the jackets of all ANHYDROPRENE cables. This marking signifies the traditionally high quality of a Simplex product.

CATALOGUE #1028

ANHYDREX-NEOPRENE — Simplex ANHYDREX-NEOPRENE Cables have the added mechanical protection of a heavy wall of neoprene jacketing. These cables are manufactured for use in aerial installations and for direct burial service. Stock sizes AWG 14 to 1000 MCM are recommended for 90 C service in WET or DRY locations.

CATALOGUE #1028

ANHYDREX-PLASTEX — Simplex ANHYDREX-PLASTEX (ANHYDREX-insulated, PLASTEX-jacketed) Cables are scientifically designed for compatibility between insulation and jacket, and for perfectly balanced performance in ducts, conduits, aerial and direct burial installations. ANHYDREX-PLASTEX Cables are recommended for service in a number of environments but especially where oils and chemicals are a problem.

CATALOGUE #1028

ANHYDREX Insulated Control Cables — Simplex ANHYDREX Control, Signal and Communication Cables have an additional thickness of appropriately coded neoprene over each individual conductor, plus heavy-duty neoprene jackets. ANHYDREX insulation provides excellent signal reproduction and is exceptionally stable, even when operating with high ambient temperatures.

CATALOGUE #1028

ANHYDREX XX — Simplex ANHYDREX XX is a butyl-based insulation of the highest possible quality. Because of its exceptional resistance to heat and ozone, it has general applications in circuits operating up to 35,000 volts, with permissible conductor temperatures of 90 C. to 5KV, and 85 C to 17KV — in wet or dry locations.

CATALOGUE #1023

CONDEX — Simplex CONDEX Cables are protected against mechanical damage by interlocked metallic armor. The armor is manufactured of galvanized steel, plain or baked enameled (colored) aluminum, bronze or other metals, and can be applied over any cable core within a very wide diameter range. CONDEX Cables may be further protected by a thermoplastic covering over or under the metallic armor.

CATALOGUE #1024

TIREX SO and SJO Cords — TIREX SO and SJO Cords are constructed to meet the most rigid specifications. All of their special features are carefully selected and processed to give maximum qualifications for portable service. They will twist without kinking, and bend without breaking. TIREX stranding affords maximum flexibility without sacrificing strength.

Conductor temperature rating 75c

CATALOGUE #992

TIREX Low Voltage Portable Cables — TIREX Low Voltage Cables are individually designed for specific applications. They are practically indestructible when used to do the work for which they are intended.

Conductor temperature rating 75c

CATALOGUES #992 & #1011

TIREX High Voltage Portable Cables — TIREX High Voltage Portable Cables have unequaled strength and versatility. Designed primarily to transmit energy to mobile electrical equipment, they are also used as temporary power lines during alterations or emergency repairs.

Conductor temperature rating 75c

CATALOGUE #1012

TIREX Mine Locomotive Cables — TIREX Mine Locomotive Cables — both single and two-conductor concentric — are approved by the Bureau of Mines and have the raised marking "P-101 BM" on their heavy-duty neoprene jackets. All TIREX Cables are cured and conditioned for service in lead.

Conductor temperature rating 75c

CATALOGUE #1011

TIREX Mining Machine and Shuttle Car Cables — TIREX Mining Machine and Shuttle Car Cables are designed for stability under today's rigorous mining conditions. The insulated conductors are "ribbed" or gear-shaped. This feature causes them to interlock with the heavy duty neoprene jacket and prevents them from slipping. Both Type W and Type G have "P-101 BM" molded onto the jacket.

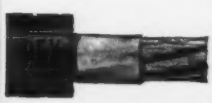
Conductor temperature rating 75c

CATALOGUE #1011

TIREX Dredge and Shovel Cables — TIREX Dredge and Shovel Cables are masterpieces of engineering achievement. Every consideration has been given to safety and durability. Simplex special cured-in-lead neoprene armor effectively resists all the elements normally encountered in this type of work.

Conductor temperature rating 75c

CATALOGUE #1012



TIREX Welding Cables —TIREX Welding Cables are scientifically stranded for maximum flexibility without wrist drag. Cured-in-lead neoprene jackets provide utmost safety for both operator and bystanders.

Conductor temperature rating 75c

CATALOGUE #1011

HELP SAVE ON MAINTENANCE

Graybar Everything Electrical

Thor

Everything you want in Electric Drills . . .

and more!

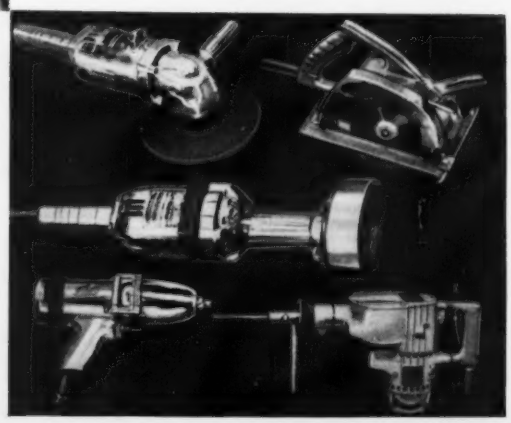
Thor's series of universal electric drills have earned an enviable reputation for high quality and outstanding performance. Standouts wherever quality and reserve power are needed. All ball-bearing construction and Thor-built motors assure long, trouble-free life on the job. In ¼" to 1¼" capacities. Complete range of speeds, angle attachments and accessories. Thor Power Tool Company, Aurora, Illinois. Branches in all principal cities.

Thor POWER TOOLS

Thor

Everything you want in Electric Tools...*and more!*

Sixty-five years in the tool business has taught us everything about building quality into our whole range of products—drills, impact wrenches, grinders, screwdrivers and nut setters and saws. We make tools better and service them better through a network of twenty-three branch offices and qualified distributors.



GraybaR PRODUCTS OF QUALITY

Your guarantee of quality-

Triangle makes many types to one standard...

IT MUST BE RIGHT!

AIRPORT LIGHTING CABLE
CAA Specification L-824
APPLIANCE WIRE
Thermoplastic, U/L
ARMORED CABLE
Type ACL, U/L
ARMORED LEAD CABLE
Type ACL, U/L
BUILDING WIRE
All Types, U/L
CATHODIC PROTECTION CABLE
Polyethylene Insulation, PVC Sheath
CONDUIT
U/L. Rigid Steel, Hot-Dipped Galvanized or black Enameled: Flexible Steel, Hot-Dipped Galvanized; EMT, Electro-Galvanized
CONTROL CABLES
IPCEA. Rubber, Thermoplastic or VC Insulation; Braid, Neoprene, Thermoplastic or Lead Sheath
FIXTURE WIRE
All Types, U/L
SUBMERSIBLE PUMP CABLE
Rubber Insulation, Neoprene Sheath
WEATHERPROOF LINE WIRE
Neoprene or Polyethylene Type
NON-METALLIC SHEATHED CABLES
Types NM, NMC-UF, U/L
PARKWAY CABLES
IPCEA. Rubber or VC Insulation; Lead or Neoprene Sheath; Flat, Plain Steel, Galvanized, or Steel Armor
POWER CABLES
IPCEA. Rubber or VC, or Asbestos and VC Insulation; Braid, Neoprene Lead Sheath or Interlocked Armor
SERIES STREET LIGHTING CABLE
IPCEA. Rubber or Thermoplastic Insulation; Neoprene, Thermoplastic or Lead Sheath.
SERVICE CABLES
Service Entrance, Type SE Styles A, U. Type USE, Style RR Service Drop Type SD, Style SDC. Self-supporting Service Drop: Neoprene or Polyethylene Insulation; Rubber Insulation, Neoprene Sheath.
TREE WIRE
Rubber Insulated, Neoprene Sheath.

Wire • Cable
Conduit • Plastic Pipe
Brass and Copper Tube

TRIANGLE CONDUIT & CABLE CO., INC.

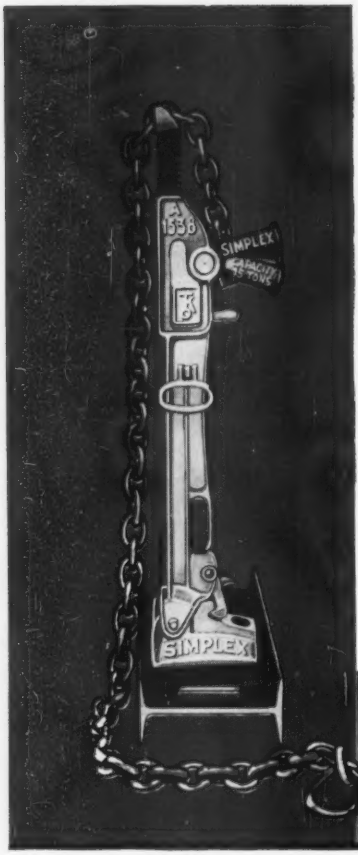
New Brunswick, N. J.

"It MUST Be Right!"®

Manufacturers of Arteries for Electricity, Liquids and Gases

HELP SAVE ON MAINTENANCE

Graybar Everything Electrical



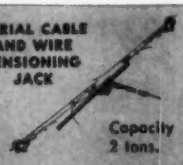
Pull Any Size Pole *Easier*

with the ALUMINUM ALLOY SIMPLEX POLE JACK

15 Ton Capacity . . . . Weighs only 60 Pounds

Aluminum housing of the Simplex heavy-duty Pole Jack eliminates 35 pounds of weight, without sacrificing a pound of lifting capacity. You can pull or straighten poles, pull butts or move loaded poles without interruption to service—and without digging. Only 60 pounds in weight, it's easy to move from job to job; saves time and work. The husky "I" beam base gives a firm foundation; jack pivots on the base when pawl is disengaged. The A-1538 has 15-ton capacity and 22-inch lift. Comes completely equipped with new alloy steel chain and lever bar.

AERIAL CABLE AND WIRE TENSIONING JACK



Capacity 2 tons.

MANHOLE SHEAVE

Handles up to 3-inches diameter cable or any size winch line.

JUNIOR POLE JACK No. 325

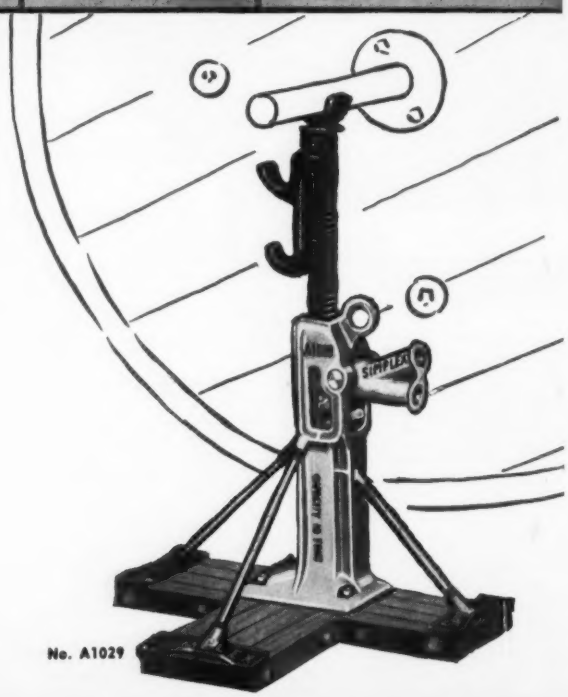
Pulls or straightens poles up to 30 feet high. 5-ton capacity.

Simplex ALUMINUM Reel Jacks

for safe handling of all reel sizes

No. A1029—Single Acting, 10 Ton Capacity. Aluminum alloy housing reduces weight 21 pounds. For outside work where footing may be uneven. T-shaped base has total area of 319 square inches, with three threaded and adjustable steel rods insuring a firm, non-rocking foundation. Furnished with left and right hand bases; Jacks are generally paired to keep operators in sight of each other for even lifting. Handles reels from 36″ to 84″ in diameter. Equipped with 3 lifting hooks 17″, 23″ and 29″, respectively, from ground level. Top hook for 3″ spindles, and the other 2 for 2½″ spindles.

Get full information now from your Graybar Branch, or write for Mechanical Catalog No. 60



No. A1029

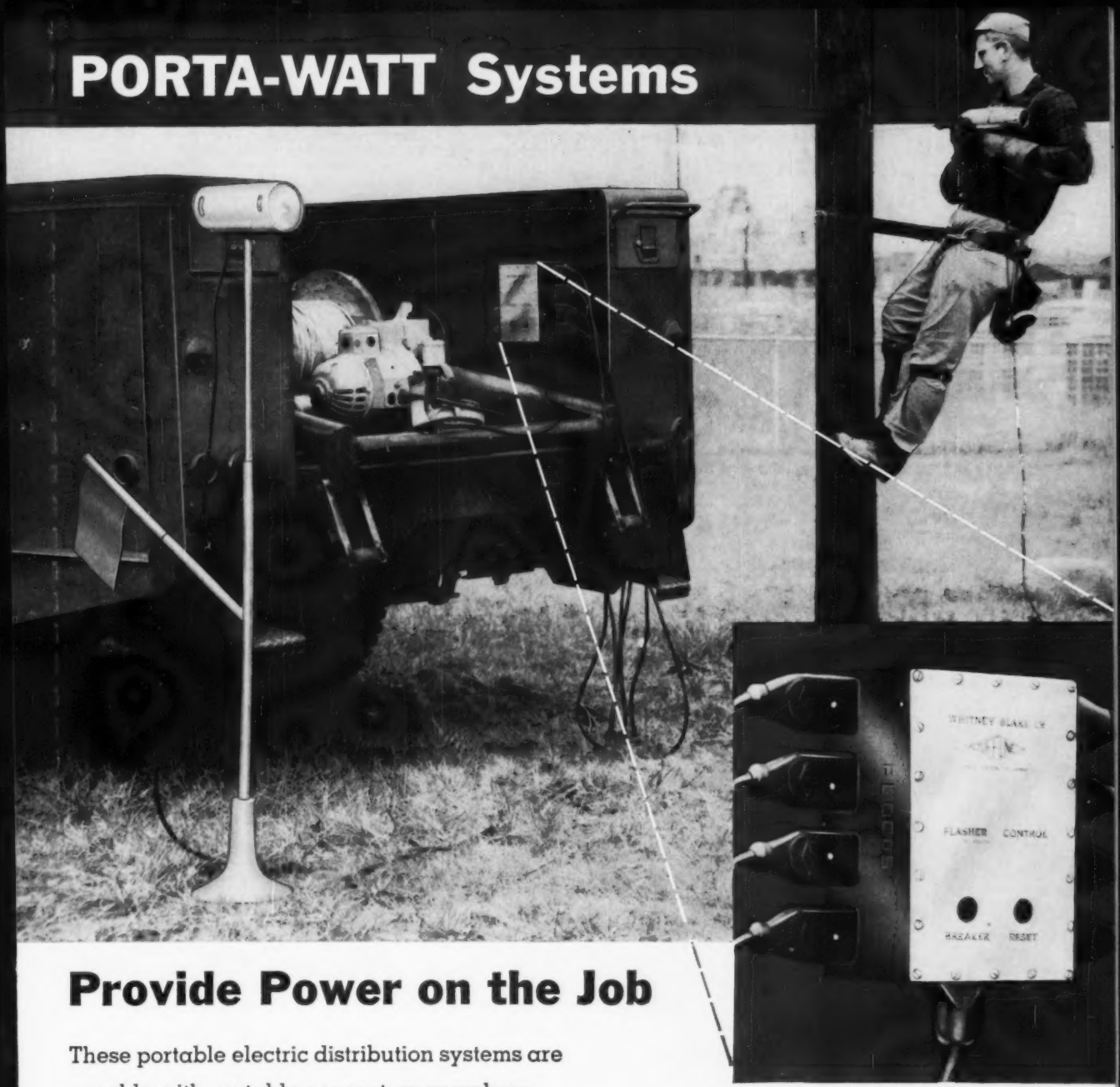
WORLD'S LARGEST MFGRS. OF INDUSTRIAL MECHANICAL AND HYDRAULIC JACKS

SIMPLEX JACKS

TEMPLETON, KENLY & COMPANY
2515 Gardner Road • Broadview, Illinois

GraybaR PRODUCTS OF QUALITY

PORTA-WATT Systems



Provide Power on the Job

These portable electric distribution systems are useable with portable generators anywhere. Installation and maintenance crews can be entirely independent of fixed power sources.

Write for descriptive Bulletin TL-3 . . . it's Free

TUFFLINE DIVISION

NEW HAVEN 14, CONNECTICUT • TELEPHONE CHestnut 8-5515 • TWX: NH84

Note these Features

Easily attached to truck or trailer.
Interrupted and/or steady power.
Molded neoprene components.
DYNAPRENE Cord, yellow or black
Safety engineered.
Completely waterproof
Accessories and extensions available.

HELP SAVE ON MAINTENANCE

Graybar Everything Electrical

WITH QUALITY PRODUCTS like those on the preceding pages

To help you choose what you need for top performance and low maintenance, the Graybar warehouse in your area is staffed with highly trained, courteous personnel—pledged to give you service unexcelled anywhere. Graybar offers you the widest range of modern utility equipment and supplies available from any single source.

Make Graybar your auxiliary warehouse—call the one nearest you

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Birmingham
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962

Graybar Everything Electrical Graybar Electric Company

GRAYBAR ELECTRIC COMPANY, INC. • 420 Lexington Avenue, New York 17, N. Y. In over 130 principal cities

ORDERS ▶ **Plea for smoothing out the ordering cycle** was put before the Edison Electric Institute convention earlier this month by Charles E. Oakes, chairman of the board of Pennsylvania Power & Light Co. Said Oakes, "It is my belief that it would be advantageous to both the manufacturers and the utilities if the two got together and scheduled the new units to be installed in such a manner that the manufacturing facilities would have a uniform rate of production." (For full EEI report, see page 93.)

FLEETS ▶ **Inducement to take good care of leased cars** is a "built-in" feature of the Service Leasing Corp. When the lessee decides to replace the vehicle, SLC experts sell it at the best price available. If the price exceeds the original cost paid by Service Leasing minus the total depreciation factor (normally figured at 2% per month), the lessee gets a check from Service Leasing for the difference.

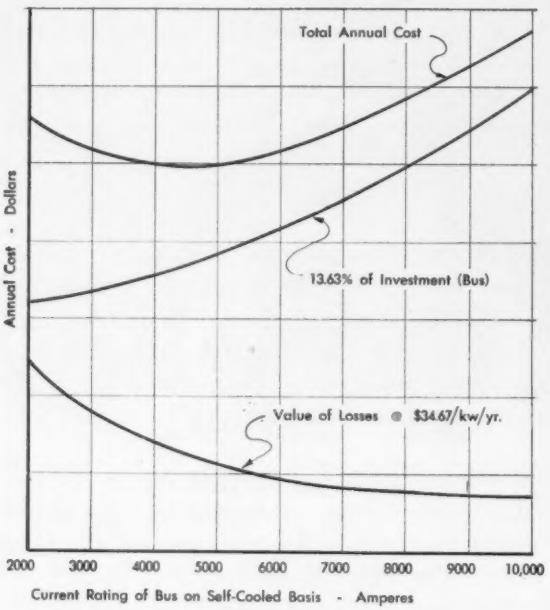
AWARD ▶ **Detroit Edison Co Vice President Chester F. Ogden** won the top honor award of the National Association of Purchasing Agents this year on the basis of his industrial purchasing achievements and long service in key NAPA posts. Although trained as a mechanical engineer, Ogden has devoted his career to buying and management duties.

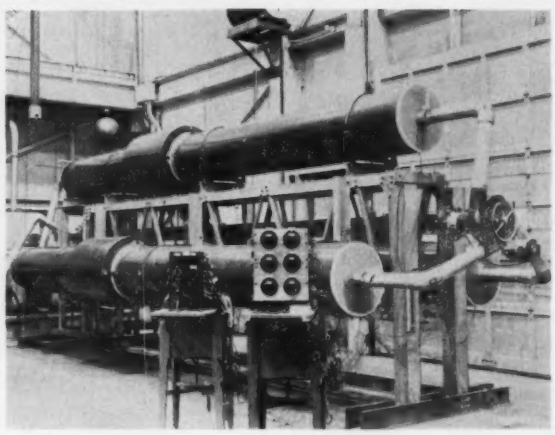
PERSONNEL ▶ **Ogden has recently helped to develop a new rating form** for performance of purchasing personnel in his company. The form consists of a statistics sheet on which is recorded such items as dollar value of orders, number of salesmen interviewed, number of orders placed by each person being rated; and an evaluation sheet on which ratings are given on "relationship with people," "personal traits, aptitudes, and abilities," and "basic purchasing knowledge and skills."

PRICES ▶ **Prices of certain types of indoor distribution equipment** have been raised 10%. General Electric Co started the ball rolling May 31 by notifying salesmen and distributors that prices would be hiked 10% after June 17 on fusible and circuit breaker load centers, safety switches, and navy breakers. Federal Pacific Electric followed immediately with the same price hike effective June 24, but added in bus duct, industrial-type and molded case circuit breakers, and panel and switch boards. Then I-T-E Circuit Breaker Co on June 8 made an announcement similar to FPE with price hikes to be effective immediately. As with the other companies, I-T-E said the increase was due to increased labor and material costs. I-T-E added that a study was being made of other of its products with respect to over and under pricing.

COAL ▶ **Studies aimed at the most efficient use of** the sub-bituminous coal from the Eden Ridge field are being conducted by Pacific Power & Light Co. The utility recently shipped a 60-ton sample of the coal to Colorado School of Mines for a series of laboratory tests.

I-T-E Designs Liquid-Cooled Buses





COMPARISON OF ANNUAL COST AND LOSSES for 10,000-amp on a 400-ft bus run, hypothetical case used by I-T-E (left), with optimum sized bus appearing as 4,000-5,000 amp for self-cooled size when used with liquid cooling. In test runs (above) water and oil coolants were used for 3-phase bus designed to carry 10,000 amp at 23 kv

I-T-E Circuit Breaker Co says it is possible to lower operating costs and cut down space requirements for isolated 3-phase buses by applying liquid cooling, either water or oil. Bus sizes have been growing larger, year by year, as sizes of other power equipment have expanded. Particularly when long runs are involved, buses have become a major cost item. I-T-E therefore centered its attention on forced cooling as a means of reducing costs for high-current long runs.

A 4½-in.-OD aluminum tube and a 21½-in.-OD aluminum enclosure were used in the bus shown here, cooled in I-T-E's Greensburg laboratory by both water and oil in separate test runs of 3-phase bus designed to carry 10,000 amp at 23 kv to obtain thermal, hydraulic, and electrical design data. If a 10,000-amp self-cooled bus had been used, the outside diameter of the conductor would have been 17½ in. and size of the enclosure 33 in. OD.

Significantly lower operating costs and space savings were indicated for bus runs carrying over 10,000 amp for distances of 200 ft and over, I-T-E says. No additional cooling would be required, even for runs as long as 1,000 ft, the company points out.

In exploring methods of force-cooling buses by liquid and air, I-T-E assembled basic data which can be used in analyzing any specific application to indicate the most economical bus system on an annual cost basis. Such analyses take into account amortization of capital costs of the complete bus and cooling system, cost of power losses in the conductor, and costs associated with the equipment required to produce lost power. In the hypothetical case used in the cost comparison made in the graph (above, left) optimum size of self-cooled bus for a 10,000-amp, 400-ft run, using liquid cooling, is between 4,000 to 5,000 amp.

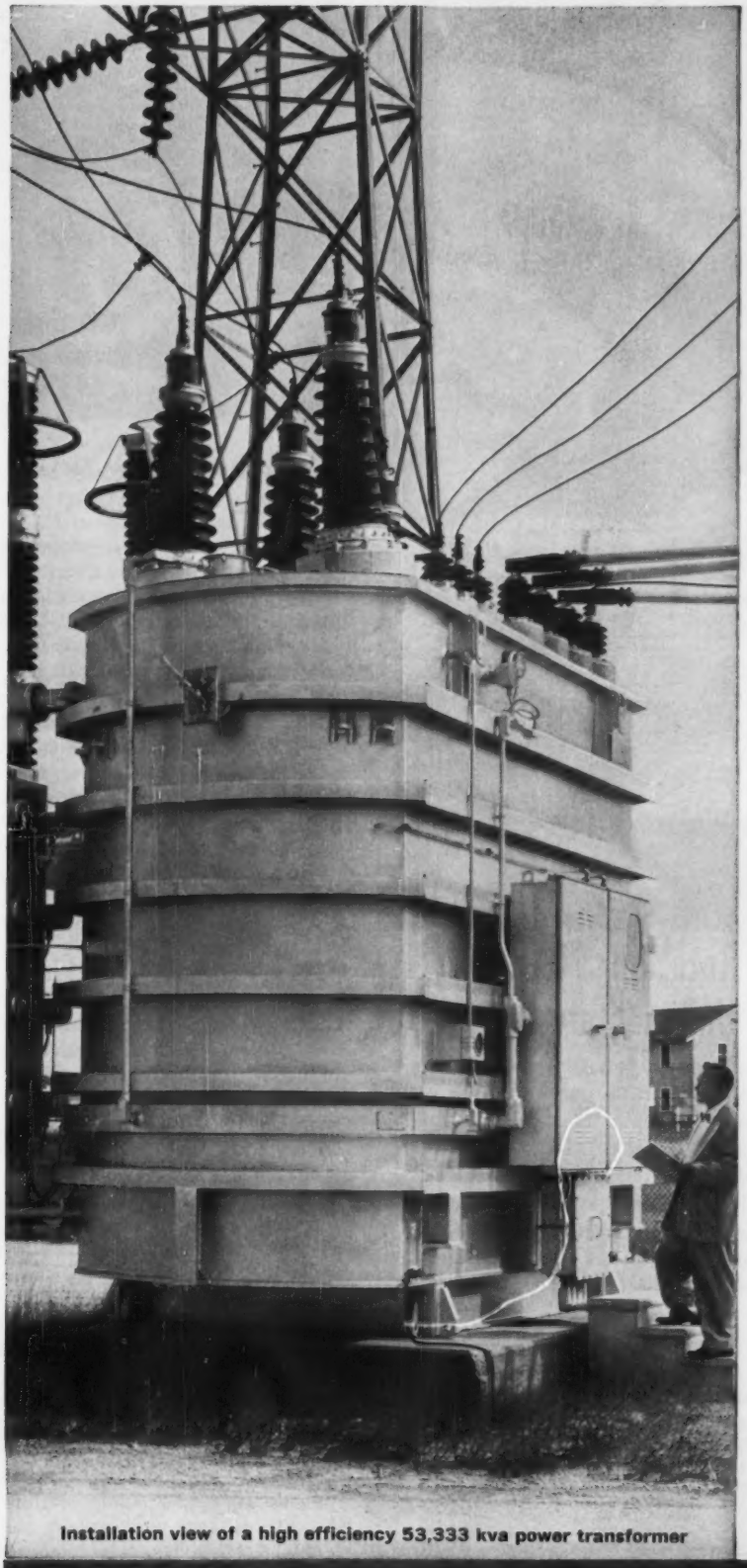
In the tests, power was supplied by a special laboratory 3-phase thermal transformer. Individual phase currents were regulated by induction voltage regulators and measured by meters connected to current transformers mounted on the transformer secondary. Thermocouples measured temperature rise at various points.

First test runs used oil as coolant, and were completed in March 1959. The company says this project demonstrated the merits of liquid cooling through a distance of up to 1,000 ft of conductor without removing the coolant for additional cooling. Tests showed that, by investing in relatively inexpensive auxiliaries, significant amount of overload capacity could be provided.

The second series of tests, using water as coolant, was completed last October. Ordinary tap water was used with an ion exchanger to obtain necessary purity. These tests proved that the extra thermal capacity of water can be used to advantage in reducing the cost of large bus structures.

I-T-E marks the addition of liquid-cooled bus as a significant extension of its line of heavy-current carrying buses. It now produces self-cooled, forced gas-cooled, liquid-cooled, and phase-isolated metal-enclosed switching stations, through 20,000 amp and up to 138 kv. Comments I-T-E spokesman, "The development of liquid cooling as a practical method paces the rapid growth in size of electrical generating facilities and adds another tool for lowering costs."

(*More News of Manufacturers, p* 162)



Installation view of a high efficiency 53,333 kva power transformer

UNIVOLT® 35 TRANSFORMER OIL

High Oxidation Stability... Low Power Factor

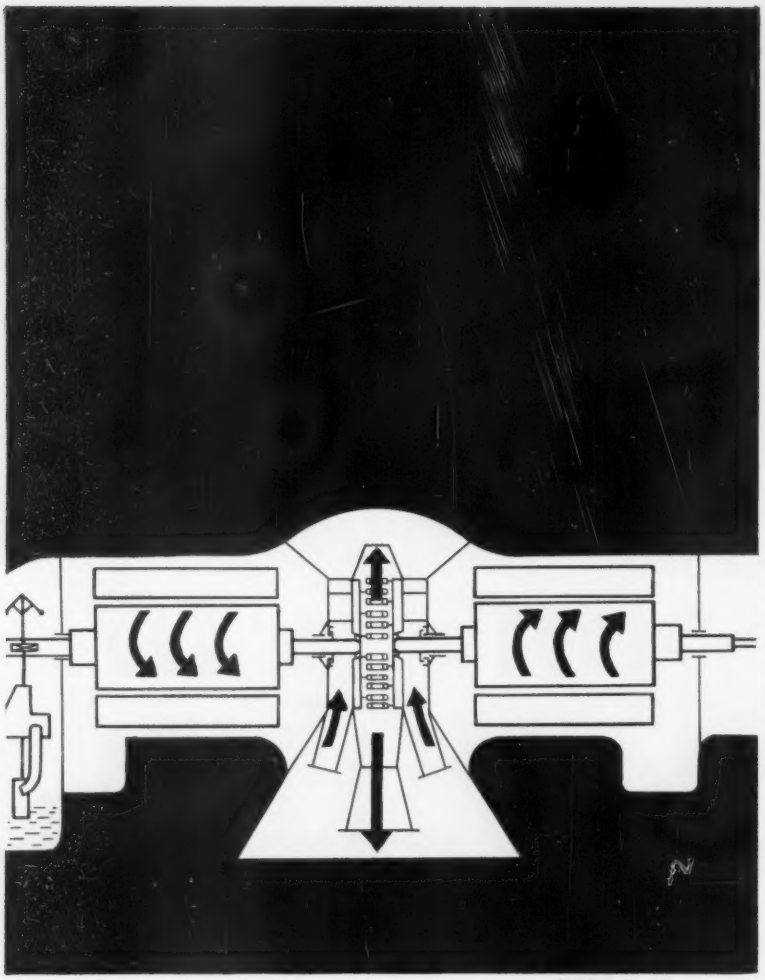
Univolt 35 is an outstanding transformer oil because of its excellent oxidation stability, low power factor and lasting insulation action. This dependable, proved-in-use product is refined from a high quality, specially selected straight mineral oil. Its highly desirable characteristics include low viscosity, freedom from acid, alkali and corrosive sulfur, and compatibility with the varnish finishes of coils.

Univolt 35 offers outstanding performance under the conditions of extreme heat produced by peak summer loads serving commercial and home air conditioning. The utmost care is taken in transporting Univolt 35: it is shipped in specially prepared and inspected tank cars which are loaded indoors.

Univolt N36 is another high quality transformer oil. Perfected by Esso Research, it possesses all the characteristics of Univolt 35 plus an effective oxidation inhibitor. For complete information write: Esso Standard, Division of Humble Oil & Refining Company, 15 West 51st Street, New York 19, New York.

Esso

In Industry after Industry..."ESSO RESEARCH works wonders with oil"

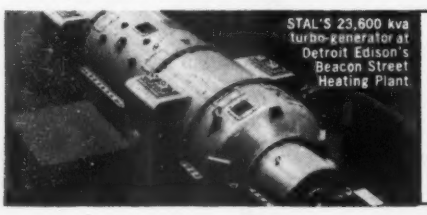


The First Radial Double Rotation STAL Steam Turbine In The United States

The last word in thermodynamic efficiency, lowest space requirements, inexpensive foundations, and low crane costs is Sweden's Radial Double Rotation STAL Steam Turbine. Designed to meet the most demanding requirements, STAL Steam Turbines are installed in power stations the world over with unparalled success. The ease of handling and simplicity of operation will make the Radial Double Rotation Turbine a favorite with power stations, paper mills, chemical plants and hundreds of other users in industry here. For free illustrated booklet and list of the major installations write to: ASEA ELECTRIC, INC. 500 Fifth Ave., New York 36, N. Y./55 New Montgomery St., San Francisco, Cal.

U.S. Representatives DeLaval-Ljungström Turbine Co.

ASEA



STAL'S 23,600 kva turbo-generator at Detroit Edison's Beacon Street Heating Plant

Specifications

Make	STAL
Type	Radial flow double rotation
Throttle Steam Conditions	870 psig, 700F
Maximum Throttle Flow	500,000 lbs/hr.
Heaviest Life During Erection	21.5 tons
Turbine Heat Rate	3506 Btu/kwhr
2-3600 rpm Generators	Air Cooled
Power Factor	0.85
Back Pressure	150 psig
Rating	23,600 kva (combined)

GE Introduces New Design For Motor Connections

General Electric has developed a new method of making and securing stator winding connections on large induction motors.

A pre-engineered harness system, for which patent is pending, provides simpler and more reliable connections, uniform for all machines of given type and rating.

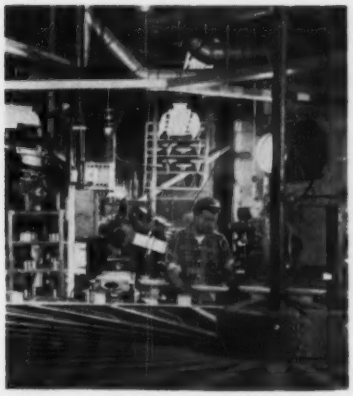
The new technique is being used on all GE's two-pole boiler feed pump motors, 1500 hp and above. GE plans to extend application to other types and ratings.

The method consists of two rings or "harnesses" of insulated conductors encapsulated in epoxy resin. Short leads emerge from one harness at the precise points for making series connections among various coils. Entrance cable connections are included in the ring and do not have to be made by hand during the motor assembly.

The second harness of similar construction contains connections for equalizing phase unbalances and suppressing harmonics.

GE says the harness system adds mechanical strength to the whole end turn assembly, where conductors and leads are normally subject to varying magnetic forces during operation. Molding of the completely insulated conductors in each ring in a supported epoxy resin prevents conductors from rubbing together.

The harnesses do not interfere with maintenance and repair. Individual stator coils can be removed and replaced as easily as in the old design.



Insulator Movie Available

A 25-min sound-color film, said to offer utility personnel a brief and highly informative review of major technological advances in the field of suspension insulators, is available for showing through local Ohio Brass Co representatives. Title of the O-B film is "The Second 50 Million."

MANUFACTURERS BRIEFS

The area in which **Line Material** recently became sole distributor of all **Hughes Bros'** catalog items is generally east of the Mississippi River with few exceptions, including some warehouses. A previous item incorrectly implied the LM area would be all of the US.

Western Insulated Wire, Los Angeles, is now in the electrical connector field. The name "Bronco Grip" is used to identify the new line of electrical fittings and accessories for both copper and aluminum wires.

Republic Foil announces construction of its $750,000 high-speed four-high rundown strip mill is proceeding ahead of schedule. Initial mill operation was formerly scheduled for January 1961. The installation will allow the firm to obtain from its suppliers reroll foil stock at twice present thickness, also enable metal to be reduced at very high speeds.

Consolidated Diesel Electric's power equipment division has been awarded a $1.8-million contract to build 354 100-kw engine-generator sets for Army Corps of Engineers. For emergency use, they will provide 60-cycle ac at 120, 208, or 416 v.

(*More Manufacturers News, p* 164)

USCO TYPE HH-2

HIGH-CURRENT HOOKSTICK SWITCH

Shown 15 KV, 2,000 Amps.
Available 7.5–69 KV, 1200 & 2000 Amps.

TERMINAL to TERMINAL current travels a CONTINUOUS COPPER PATH!

The new USCO HH-2 offers utility engineers a ruggedly designed, *amazingly easy-to-operate* switch that will provide superior performance under the most adverse conditions. The HH-2 employs one-piece solid copper bus bars to form the contact post and terminal pad at *both* the hinge and jaw ends making a continuous copper current path. The HH-2 also includes these outstanding design features:

- Large 3 x 4 oval operating ring *engages easily.*
- Cam-out leverage *exceeds* a 4:1 ratio.
- Blade guide *assures* positive alignment.
- Blade latch *prevents* accidental opening.
- Hi-pressure *silver to copper* line contacts.
- Heavy-duty trussed blades, wide-spaced for *rigidity* and *natural cooling.*
- Base custom fabricated to *your* specifications.
- *Your* choice of terminal pad designs for specific applications.

Send your next inquiry to USCO . . . it will be answered immediately.

USCO Power Equipment Corp.

829 North 36th Way, Birmingham 4, Alabama • Phone LYric 2-7241

Designers and Manufacturers of High Voltage Electrical Equipment for Utilities, Cooperatives and Industry.

10,000 pounds Handled Hydraulically

simple one-man operation

. . . performs difficult work faster and easier with this new heavy-duty cable reel trailer by Highway

- Hydraulic operation of all action
- Designed to handle the largest reels up to 84″ in diameter—48″ wide and up to 10,000 pounds in weight
- Heavy box construction assures many years of efficient, low-maintenance service
- Double spring suspension (elliptical leaf spring plus coil springs) assures outstanding roadability and off-road operation
- Large-capacity 1100 x 20 tires
- Cab-controlled electric brakes and ICC rear lights

"CABLE SPLICING MADE EASY"

The Model 30-S trailer is an all-steel, compact, complete cable splicer's field workshop. Complete tool and accessory trays and compartments—fire-proof, weatherproof and theft-proof—1400 lbs. capacity. Heavy-duty construction throughout.

For complete information on the new hydraulic heavy-duty cable reel trailer and cable splicer trailer, see your local Highway distributor—or write directly to

UTILITY DIVISION

HIGHWAY TRAILER COMPANY

HEADQUARTERS: STOUGHTON, WISCONSIN

Manufacturers of Public Utility Bodies • Earth-Boring Machines • Pole and Cable Reel Trailers • Winches • Power Take-Offs • Service Accessories • Commercial Trailers Dry-Bulk Haulers • Cargo Containers — Land, Sea and Air

SALES AND SERVICE IN PRINCIPAL CITIES

New Standards Publication Are Made Available

A publication on electro-heating applications has been published by International Electrotechnical Commission. It is available through the American Standards Assn, Dept PR160, 10 E 40 St, NYC 16, at $3.20 per copy, under designation IEC publication 50 (40), Electro-heating Applications.

New standards for thermal demand meters and watthour meter sockets have been released by joint committees of Edison Illuminating Cos, Edison Electric Institute, and National Electrical Manufacturers Assn representatives on watthour and demand meters; meter mounting and test equipment. The standards for thermal demand meters, EEI Pub No. MSJ-5; NEMA Pub No. El 15—1960, is 50¢ per copy and the standards on watthour meter sockets, EEI Pub No MSJ-7; NEMA Pub El 17—1960, @ 75¢.

Manufacturers Literature

PORTABLE CORDS & CABLES . . . with details on properties of single to four-conductor, 600 v to 5 kv portable cables. Data on insulating and jacketing compounds. Specifications and characteristics of portable cords, including Kaiser Master Laytex and flexible cords, with special section on splicing and patching these cords. Manual, Form No. KW-915, 52 pages. Kaiser Aluminum & Chemical Sales, Inc, Dept NR-43, 300 Lakeside Dr, Oakland 12, Calif.

SPACED AERIAL CABLE . . . System, Compresto, 15 kv, for overhead distribution systems. Combined with PLM's new Wrap-Around spacers. Design, voltage drop, sag and tension, and short-circuit current. Booklet, 32 pages. Purse Co, Chattanooga 2, Tenn.

SUBSTATIONS . . . mobile, up to 20 Mva, 115 kv, and mobile transformers up to 40 Mva, 138 kv. New product features, application information, illustrations, tables. Includes approximate weights and estimated net prices. Bulletin. GEA-4415C, 24 pages. General Electric Co, Schenectady 5, N. Y.

NIAGARA

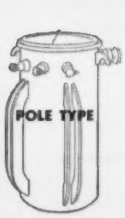
TRANSFORMERS

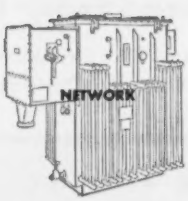
"That Niagara was out there when I started. It's been delivering power since it arrived. Never caused us a moment's trouble."

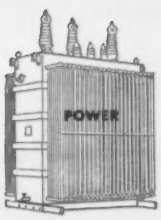
Users confirm it: Niagara Transformers are built to last a long, long time. At every stage in their manufacture, quality is strictly controlled. Everything — raw materials to completed transformers — is thoroughly tested at the Niagara plant. Specialized skills and experience assure bonus construction with liberal overload capacity.

Niagara Transformers are designed and produced for practically every service thru 10,000 kva, 69,000 volts. Write for Bulletin 139. Niagara Transformer Corp., P.O. Box 23, Buffalo 25, N. Y. Representatives in principal cities.

"After all these years, the breaker's never been opened."

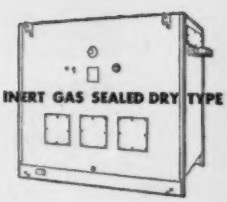

POLE TYPE


NETWORK


POWER

VENTILATED DRY TYPE

UNIT SUBSTATION


INERT GAS SEALED DRY TYPE

Amp-trap®

THE POWER CIRCUIT CURRENT LIMITER

The higher the short-circuit, the quicker ***Amp-trap*** clears the fault and limits the current to safe levels. Remember . . . interrupting capacity is not protection without current limitation. Interrupts up to 200,000 Amps. symmetrical over the entire Ampere range. Stops short circuits short. Anticipates and prevents destruction before it can occur. Faster than any ordinary fuse.

Use ***Amp-trap*** on all general power circuits, DC circuits, Networks, Entrance Switches, Busways, etc. Be safe, not sorry — ask for, get and install ***Amp-trap***.

There is one for every purpose. Write today.

Amp-trap® - "Awake At The Switch"

THE CHASE-SHAWMUT CO.

374 MERRIMAC STREET • NEWBURYPORT, MASSACHUSETTS

Subsidiary of I-T-E CIRCUIT BREAKER CO.

REGISTERED U.S. PATENT OFFICE Est. 1893

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. . . Diogenes would probably have found his honest man. If you are looking for better lighting standards and honest quality, you'll find both at Daniels Standards, Inc.

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don't go around in the dark . . .

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TWX NV-183

Daniels Standards, Inc.

1719 WEST END AVENUE
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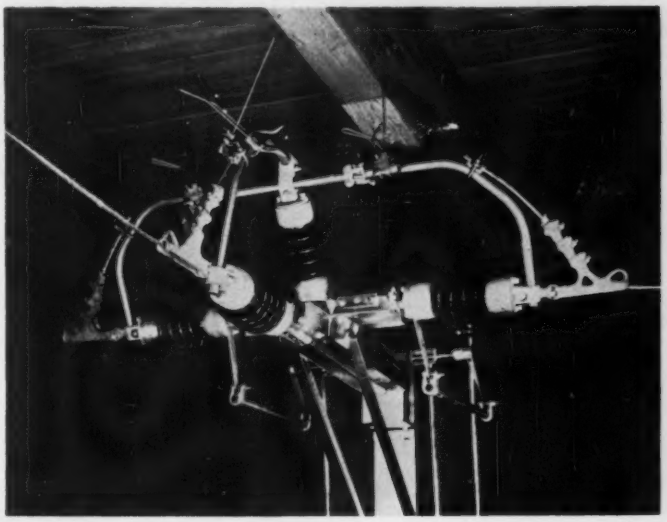
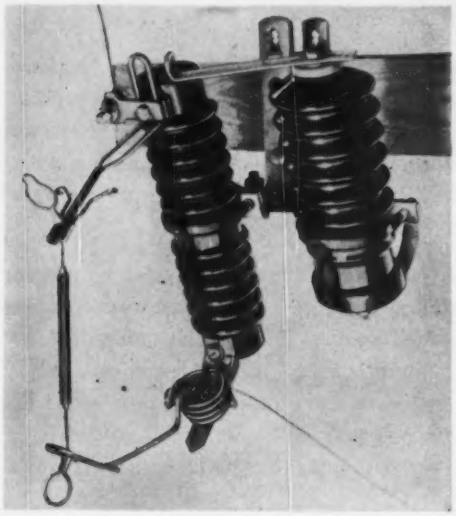
(For further information refer to Readers Service on page 170)

Line Tap Switch . . .



. . . is designed for transmission lines. The complete switch is mounted on a single pole without need for crossarms, suspension insulators or an extra-strong pole. It can be cut easily into the line in short time. Equipped with a quick-break attachment, the line tap switch will drop 40 miles of line or interrupt the magnetizing current of a 100-Mva transformer bank, both at 69 kv.

Powerdyne Inc, 17150 SW Boones Ferry Rd, Oswego, Ore.

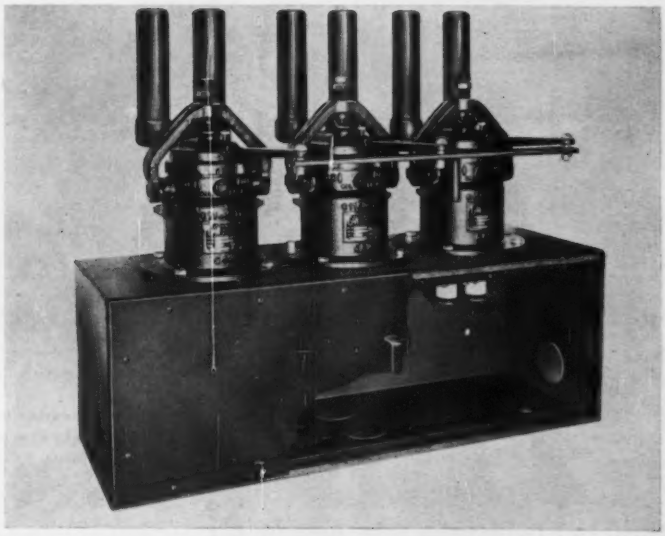


Cutout-Arrester Unit . . .

. . . for rural distribution lines is mounted on a single bracket. The set comprises a 7.8-kv open link cutout and a valve type lightning arrester, both thoroughly field tested. The combination can be installed faster than individual units and takes up less room on the crossarm.

A. B. Chance Co, Centralia, Mo.

Cutout Box . . .



. . . for indoor or outdoor installation meets NEMA standards. The type BZ box is dripproof, splashproof and moisture-resistant. The non-submersible box, which is for mounting of gang-operated, oil-filled cutouts rated at 2.5, 5 and 8 kv, has bottom ground lugs and four knockouts, two in the bottom and one at each end. Multiple boxes can be mounted side-by-side.

G&W Electric Specialty Co, 3500 W 127th St, Blue Island, Ill.

(*More New Equipment on page* 174)

More power for expansion supplied with (USS) Tiger Brand Armorlokt Cable over unique suspension bridge

This suspension bridge was built especially to carry high-voltage electrical cables from the power plant to mill at the Ohio Works of United States Steel in Youngstown. The old underground system has become inadequate and to replace it with a new underground system would have been more costly and would have disrupted mill operations.

The largest of the several cables has 500,000 C/M conductors and is 3¾ inches in overall diameter. All are insulated with Amerzone B (Butyl) rubber and protected with interlocked armor.

Armorlokt cable was used for utmost reliability. Failures of power distribution are costly, and represent production losses. This Armorlokt construction offered maximum mechanical protection and electrical reliability with the added "Plus" of complete flexibility of the finished distribution system.

Advantages of open construction. Compared to an underground conduit system, the original cost was considerably less, it provided easy access to the cables for future changes and maintenance and the space on the bridge was large enough to carry double the number of cables for future expansion.

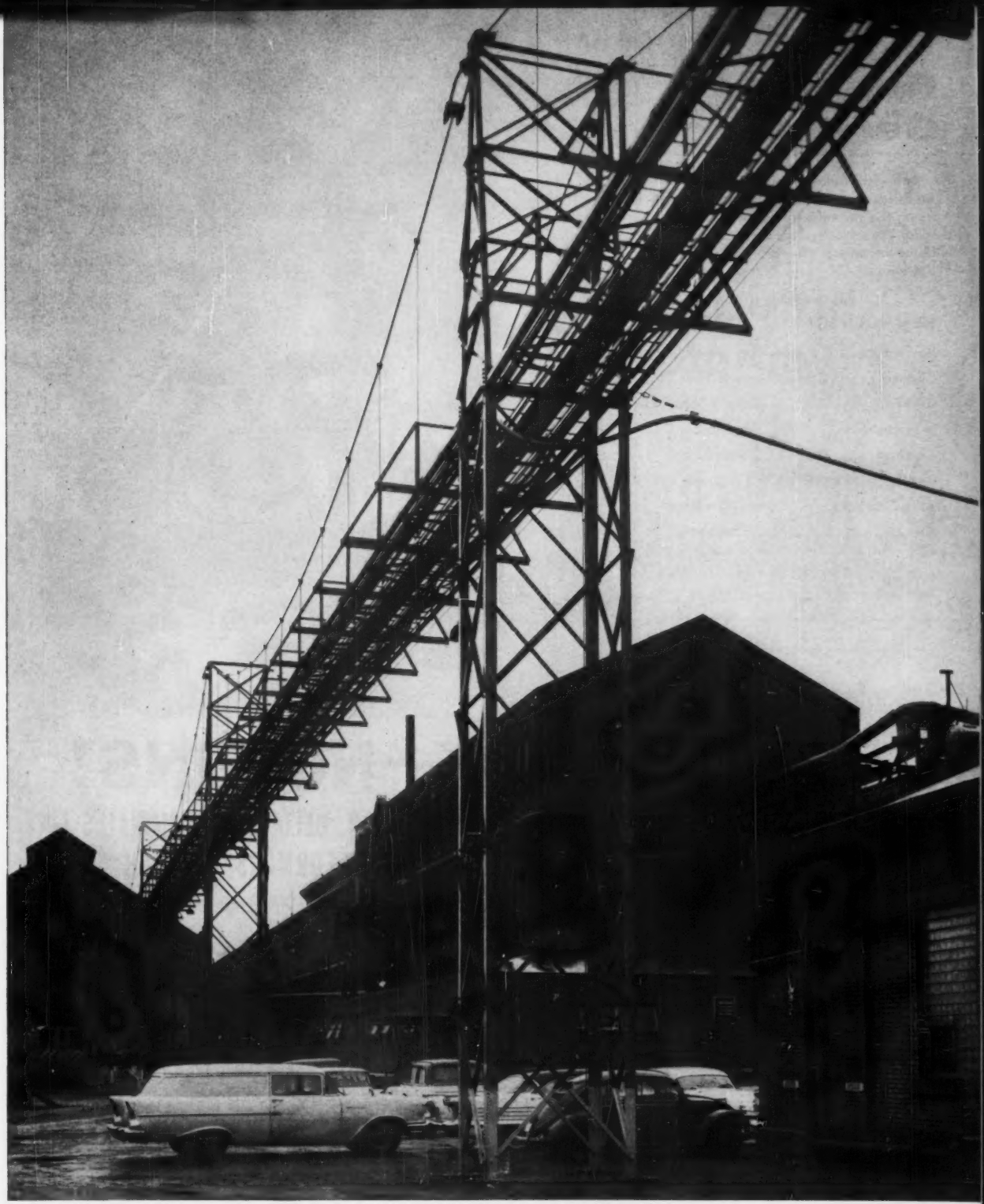
The system was planned by the Electrical Engineering Department of the Ohio Works, United States Steel, of which Mr. M. J. Burger is General Supervisor.

For complete information on USS Tiger Brand Armorlokt Cable, write American Steel & Wire, Dept. 0257, 614 Superior Ave., N.W., Cleveland 13, Ohio.

USS, Tiger Brand, and Armorlokt are registered trademarks

A standard cable for every special job • Asbestos Wire and Cable • Mold-Cured Portable Cord • Shovel & Dredge Cable • Paper & Lead Cable • Varnished Cambric Cable • Interlocked Armored Cable • Special Purpose Wire & Cable • Aerial, Underground and Submarine Cable

Suspension bridge carrying six USS Tiger Brand Armorlokt Cables out in the open for easy access.



USS Tiger Brand Armorlokt Cables offer maximum mechanical protection and electrical reliability. They can be installed in half the time required for other systems, and can be easily pulled around turns.

American Steel & Wire
Division of
United States Steel

Columbia-Geneva Steel Division, San Francisco, Pacific Coast Distributors
Tennessee Coal & Iron Division, Fairfield, Ala., Southern Distributors
United States Steel Export Company, Distributors Abroad

Readers Service

For additional information on new products, supplies, and services in this issue, the Manufacturers Editor of Electrical World offers his facilities. Check items in which you are interested in list below:

NEW EQUIPMENT

Powerdyne.....Line Tap Switch ☐
Chance.....Cutout-Arrester Unit ☐
G&W.....Cutout Box ☐
Westinghouse.....Motors ☐
Gedney .....Connectors ☐
Remington Rand.....Computer ☐
Allis-Chalmers.....Control Switch ☐
Clark .....Backhoe ☐

OTHER

_____

_____

Manufacturers Editor
Electrical World
330 W. 42nd St.
New York 36, N.Y.

* Note: Requests must be received within four weeks of publication date, accompanied by complete information specified. This service cannot be offered to readers in foreign countries or to competitive manufacturers.

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FOR:

Reference ..... ☐
Specs ..... ☐
Trial ..... ☐
Purchase ..... ☐

JUNE 20, 1960

LOOK—NO FINS!

FOR EASIER INSTALLATION, DELTA-STAR ELIMINATES FINS ON DISTRIBUTION TRANSFORMERS THROUGH 50 KVA

Elimination of cooling fins has made Delta-Star distribution transformers more compact—easier to handle and install. On all sizes through 50 KVA, weights and basic tank dimensions match competitive models. The big difference is that Delta-Star transformers save the bulk created by fins or tubes.

Elimination of cooling fins on Delta-Star transformers follows several years of evaluating the thermal characteristics of the transformers. The Delta-Star design eliminated excess heat—heat that the tank alone cannot dissipate. With no excess heat, there is no need for the cooling capacity provided by fins or tubes.

Delta-Star Distribution Transformers provide high efficiency and good regulation, as well as ease of installation. For complete information, on these cost-cutting transformers, write to *Delta-Star Electric Division, H. K. Porter Company, Inc., 2437 W. Fulton St., Chicago 12, Ill.*

DELTA-STAR PORTER **ELECTRIC DIVISION**

H. K. PORTER COMPANY, INC.

PORTER SERVES INDUSTRY with steel, rubber and friction products, asbestos textiles, high voltage electrical equipment, electrical wire and cable, wiring systems, motors, fans, blowers, specialty alloys, paints, refractories, tools, forgings and pipe fittings, roll formings and stampings, wire rope and strand.

how good should power cable be

...*for long term stability?*

It isn't enough to meet or barely surpass specifications—not when it is possible to build maximum performance into power cable—as Circle does. Take, for example, the IPCEA-NEMA 60 cycle water absorption test.

Circlesheath® Type RR Power Cable Performance

In the IPCEA-NEMA "Accelerated Water Absorption Tests," Section 6.9, a sample of power cable is immersed in 50°C water for a period of 14 days during and after which time specific inductive capacity and stability factor are measured.

Not only does Circle butyl-insulated power cable far surpass all minimum specifications after 14 days immersion—*but continues to do so after one year and eight months of continuous immersion. And the test is still going on!*

Date of original immersion: September 1958 Date of last test: April 1960

CABLE DESCRIPTION: 15KV, UNGROUNDED, SHIELDED	CIRCLESHEATH® CHANGE SIC	PERFORMANCE STABILITY FACTOR
700,000CM	4.3%	.6%
300,000CM	3.9%	.5%
300,000CM	3.6%	.4%

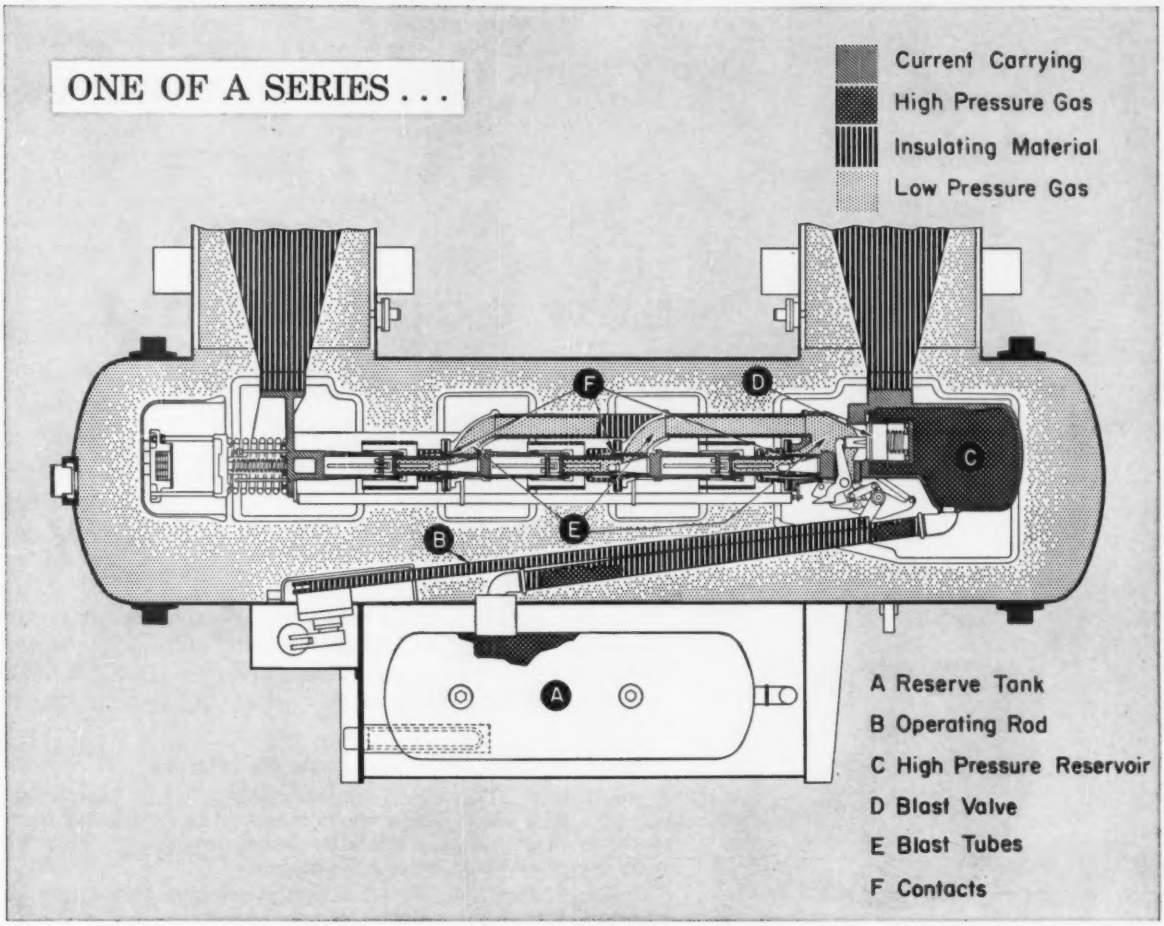
IPCEA-NEMA Requirements: Change SIC 1 to 14 days: 5% max.—stability factor after 14 days: 1% max.

The manufacture of high-reliability power cable is no accident. It requires expert knowledge of compounding techniques, absolute quality control—and production men who not only care enough . . . but *know enough* to produce the very best.

Circle's school for production men means better products for wire and cable users. Here laboratory technicians lecture on such subjects as extruding techniques, optimum operating speeds, testing procedures, etc.

CIRCLE WIRE & CABLE
a subsidiary of
CERRO DE PASCO CORPORATION

RUBBER COVERED WIRE & CABLE • VARNISHED CAMBRIC CABLE •
PLASTIC INSULATED CABLE • NEOPRENE SHEATHED CABLE • CIRTUBE* EMT



A uniform 45-psig pressure is maintained in the gas-filled pole units. Contacts in all interrupters are *opened* simultaneously by a spring accelerator. They are closed by a pneumatic mechanism, proved in years of oil breaker service.

Initial movement of the contacts opens a blast valve in the high-pressure reservoir within the pole unit, at right. SF_6 gas is directed from the high-pressure reservoir to the interrupting orifices at 220 psig to snuff out the arc.

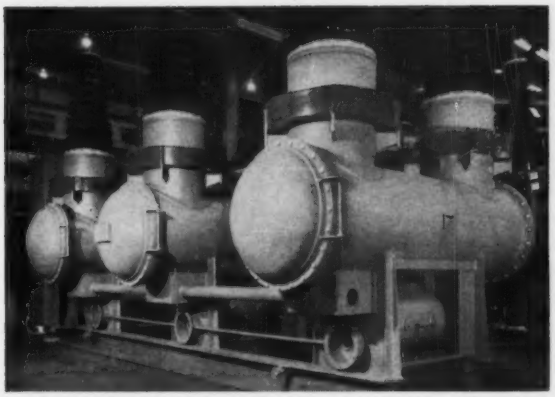
Design of new type SF_6 Gas Breaker extends operating life, slashes maintenance, reduces installation cost

Provides improved performance from 69 to 460 kv and beyond

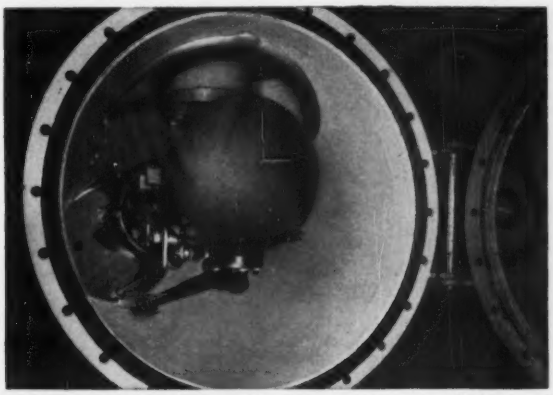
The most advanced power circuit breaker in industry today is made possible by the unique properties of the SF_6 gas interrupting medium. Remarkable dielectric strength, high recovery rate and long life of the gas, coupled with the minimum arc erosion of interrupter contacts, give the Westinghouse breaker greatly increased service life. Periods between routine inspections are *at least* twice as long as for other breakers.

Advantages of the breaker's compactness are easy to see at installation time. Ratings up to 230 kv can be shipped fully assembled to most locations on the unitized base, ready for mounting on a concrete pad. Breaker weights have been cut to *less than* ½ those of comparable oil breakers in many ratings.

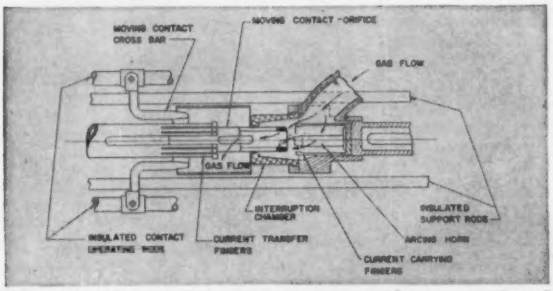
The SF_6 gas system under 45 psig is completely



self-contained to conserve the gas and provide quiet operation. High-pressure reservoirs at the end of each unique horizontal interrupter supply SF_6 gas at 220 psig to the individual interrupting chambers. Reserve capacity is assured by individual high-pressure tanks beneath each pole unit. Capacity is sufficient for four operations without pump operation. The breaker operating levers to the three poles are mechanically linked to provide synchronization of all contacts.

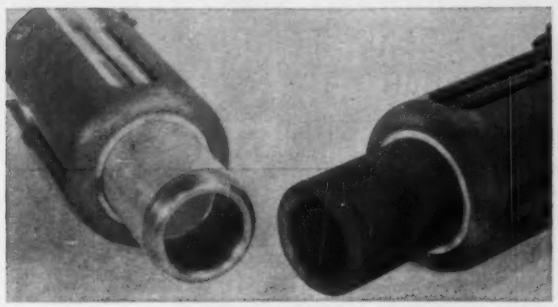


The opened tank reveals the ready accessibility of the entire interrupter. Unique insulating properties of SF_6 permit this compact design with minimum live-part to tank clearances. Bottom pipe feeds high-pressure gas to blast reservoir. Smaller rod operates breaker contacts.



The moving contacts are mounted on a pair of parallel insulating pull rods for simultaneous operation. Contact fingers of both the moving and stationary contacts are silvered cupaloy for maximum conductivity. An arcing horn inside the stationary contact absorbs the brunt of arc action. The hollow moving contact, designed to minimize arc erosion, is also faced with special arc-resistant material.

Actual interruption is contained within a teflon chamber. High-pressure gas blasts the arc between the contact surfaces and flows through the hollow moving contact . . . out ports in the side, into a Micarta® shield.



This shot illustrates the effectiveness of the new Westinghouse interrupter design. The contact at right evidences minimum erosion after 45 interruptions of between 24,000 and 45,000 amperes . . . equivalent to over 36 operations at breakers rated 37,500 amperes.

SF_6 gas has unique properties that give it exceptional arc quenching ability. In this demonstration, a high-voltage arc, readily drawn in an air-filled tube, is quickly extinguished by injecting a small amount of SF_6 gas. Sulfur-hexafluoride's electronegativity causes it to absorb free electrons . . . provides an extremely high rate of recovery of dielectric strength. Arc space is converted from a relatively good conductor at current zero to a good insulator in a few millionths of a second.

To learn more about the money-saving features of this product, call your Westinghouse sales engineer or write: Westinghouse Electric Corporation, P.O. Box 868, Pittsburgh 30, Pa. J-61001

YOU CAN BE SURE...IF IT'S
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TUNE IN WESTINGHOUSE-CBS TV-RADIO COVERAGE, PRESIDENTIAL CONVENTIONS, JULY 10-29

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UNITIZED
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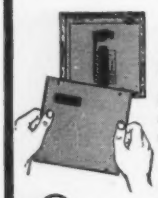
Effective! Reliable! Economical!

1 Highly effective in extremes of ambient noise and temperature.



2 Plug-in units provide ease of installation, expansion and maintenance.

3 Transistors and rugged, industrial type components used throughout.

4 Central control cabinet, costly engineering and fabrication eliminated.

Wherever a highly dependable, voice communication system for use in high noise level areas is needed—you'll find GAI-TRONICS specified by name.

GTC is extremely flexible in application. Write today for a copy of our completely illustrated, descriptive booklet and name of nearest representative.

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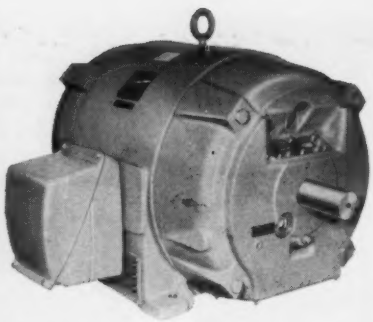
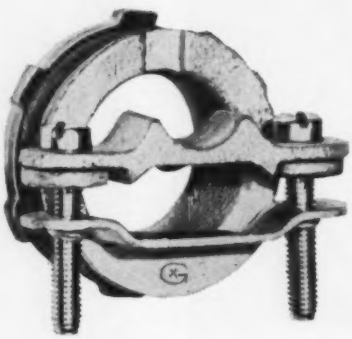


Motors . . .

. . . of 40 to 250 hp are furnished in three basic NEMA designs for various power plant purposes. The squirrel-cage Life-Line A motors have end brackets that provide drip-proof protection. Oil-lubricated bearings are grooved and have extra large oil rings for best lubrication.
Westinghouse Electric Corp, Box 2099, Pittsburgh 30, Pa.



Connectors . . .

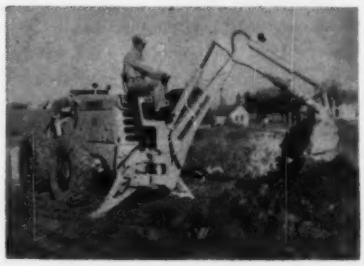
. . . of malleable iron are for armored cable, flexible conduit, service entrance and other cables. Selecting from three types permits accommodating round or oval conductors of 0.218-1.290 in. OD.
Gedney Electric Co, 1270 6th Ave, New York, N. Y.

Computing System . . .

. . . for accounting offers a full line of peripheral units. These operate on-line, but a program interrupt feature provides the advantages of off-line computer arrangements. Solid-state Univac III offers memories of up to 32,768 27-bit words. Access time is 4½ μsec. Input can be by punched cards at 700 per min or by magnetic tape. The computer gives the same types of outputs besides offering a 700-lines-per-min printer.
Remington Rand, 315 Fourth Ave, New York 10, N. Y.

Control Switch . . .

. . . has this positive positioning device, which prevents hanging up between positions and overshooting. Positive positioning, with snap action that lets the operator feel switch action, eliminates arcing, burning and excessive wear of contacts. Type 210 switches are also installed with instruments.
Allis-Chalmers Mfg Co, Milwaukee 1, Wis.



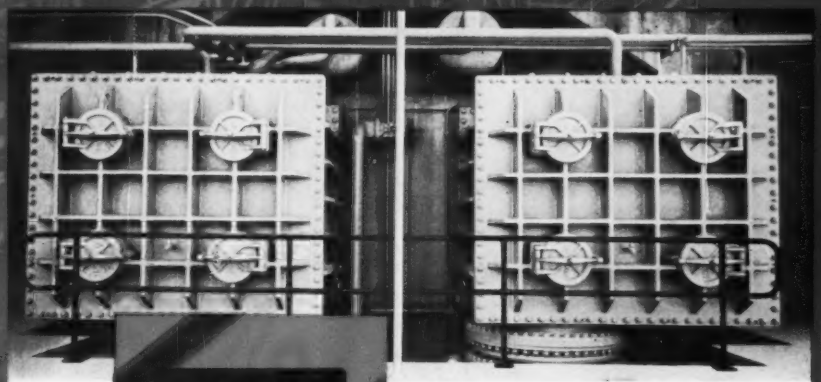
Backhoe . . .

. . . attachment snaps on or off a tractor shovel in less than a minute without tools. Snap-Mount backhoe swings in a 180-deg continuous arc and its bucket tilts 180 deg. It reaches 15 ft 6 in. from pivot and digs 12 ft 4 in. Its breakaway capacity at the bucket teeth is 5 tons.
Clark Equipment Co, Pipestone Rd, Benton Harbor, Mich.

where trouble-free performance is a matter of pride...

FLORIDA POWER & LIGHT COMPANY

Lauderdale Plant



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Typical condenser installation in the Lauderdale Plant employing approximately 352,000 linear feet of Scovill Aluminum Brass Heat Exchanger Tube, ⅞" O.D., 0.049" wall thickness.

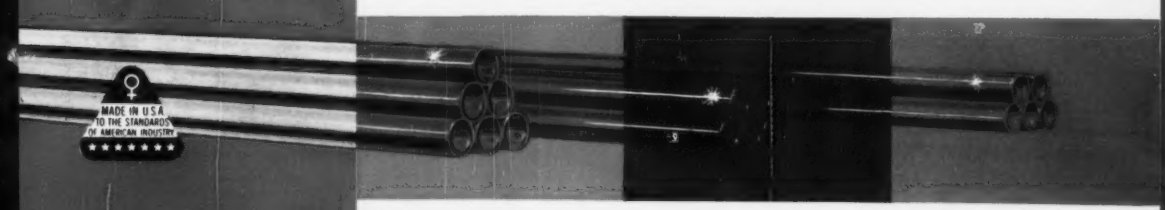
HEAT EXCHANGER TUBE

The new Lauderdale Plant of the Florida Power & Light Company is the largest power producing unit in Florida. Its condensers are tubed with Scovill ALUMINUM BRASS Heat Exchanger Tube, selected to assure trouble-free performance under specific conditions at this important station.

Aluminum Brass is a Scovill alloy that has proved to be highly resistant to corrosion by salt and brackish waters and to the combined effects of corrosion and erosion in salt water service. These good qualities are due to the special nature of the thin, adherent, continuous and self-renewing film which develops on the surfaces of this alloy in service. It is being extensively used in marine and tidewater condenser installations.

Your own condenser and heat exchanger service conditions may be similar or they may be entirely different and perhaps better served by one of Scovill's eleven other popular Tube Alloys. Scovill Technical Service, considered by many the most experienced in the field, can help you make the right selection for trouble-free operation.

HEAT EXCHANGER TUBE for Applications from Marine to Petrochemical, from Compressor Intercoolers to "Cat-Cracker" Exchangers, in these popular Alloys . . . Phosphorized Admiralty • Admiralty • Arsenical Admiralty • Red Brass, 85% • Deoxidized Copper • Arsenical Copper • Cupro-Nickel, 10%-20%-30% • Aluminum Brass • Aluminum Bronze, 5% • Muntz Metal • Duplex Tube



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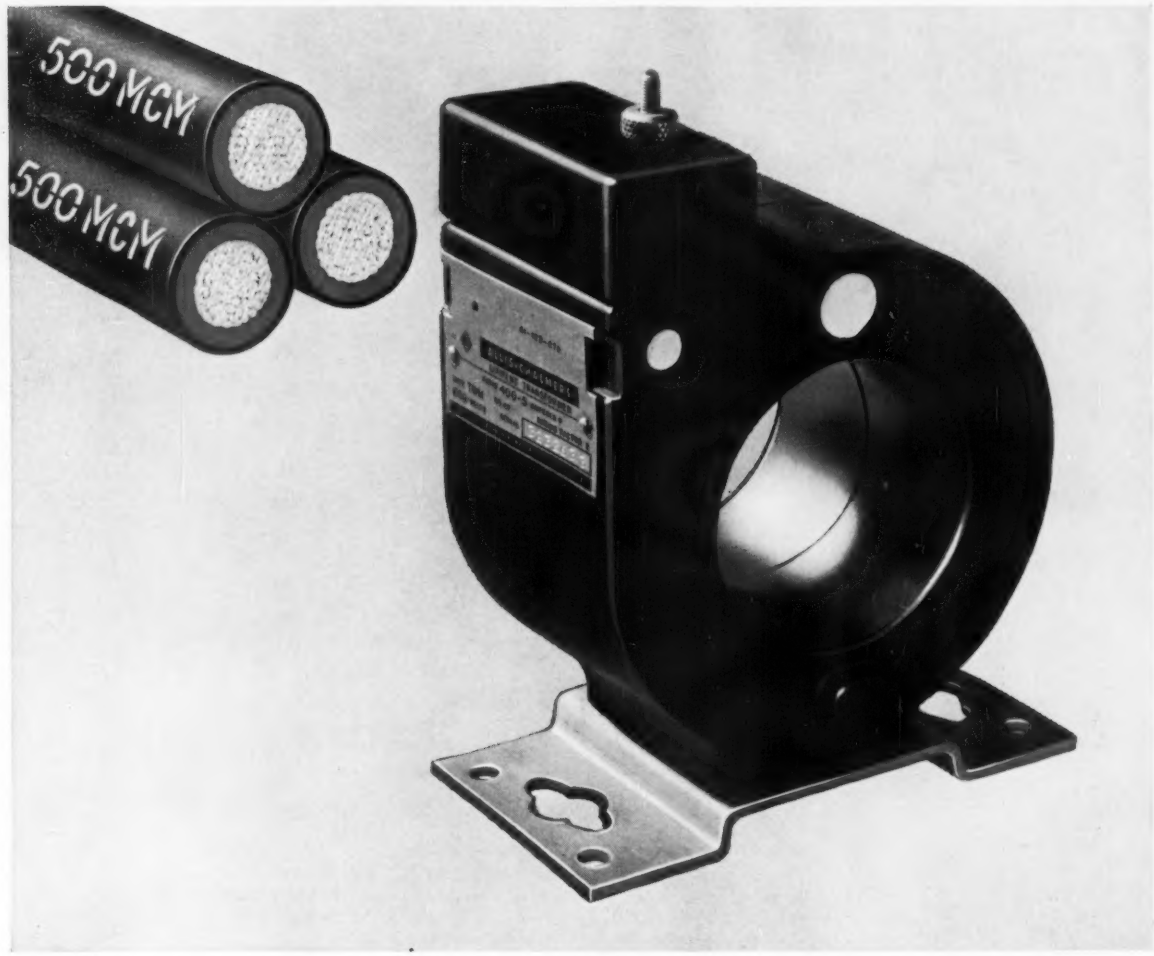
ALLIS-CHALMERS



Lightest weight with largest window

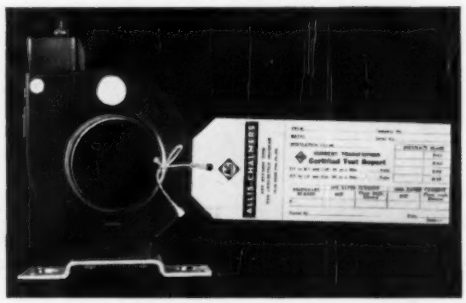
and the best accuracy available on the market today

The NEW Allis-Chalmers "PICTURE WINDOW" current transformer can easily take three 500 MCM cables.

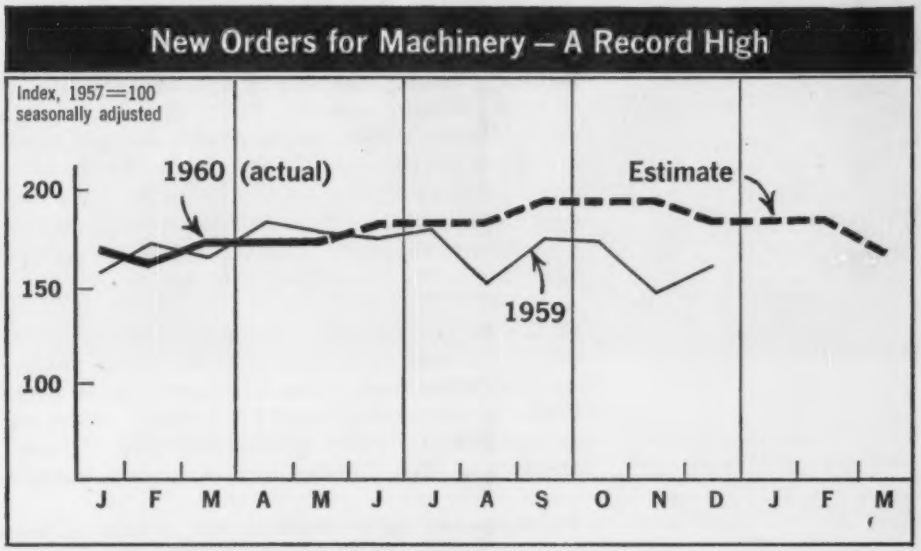
Compact, easy to install, indestructible and weatherproof — this 600-volt epoxy-resin transformer will withstand wide temperature variations and the most severe mechanical shocks. Eliminates all possible maintenance.

Easily adapted for conduit-type hookup, A-C current transformers can be used on 2 or 3-wire, single and polyphase circuits. Ratings: 200, 400, 600 and 800 amperes.

Get full details on this NEW TWM current transformer from your nearby A-C office. Or write ***Allis-Chalmers,*** *Power Equipment Division, Milwaukee 1, Wisconsin.* A-1310



Verified accuracy! Certified test card accompanies every A-C unit shipped. This A-C design provides ample overcurrent capacity without reduction of accuracy.



Source: McGraw-Hill Department of Economics

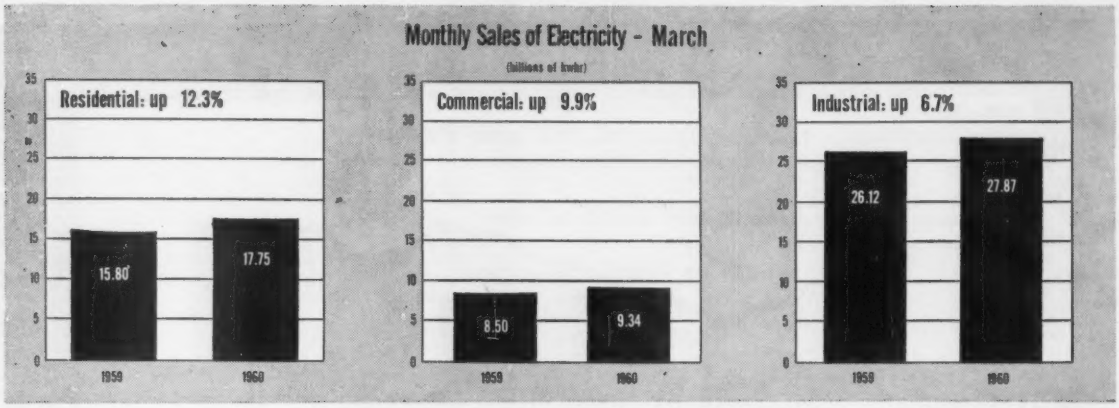
Stronger Sales Lift Business Hopes

Report on
Electrical Business Outlook

Businessmen now are a lot less apprehensive about prospects for this year than they were a few months ago. Capital spending plans are running on schedule and still show strength. New orders for machinery, now low, promise a dramatic pickup to record levels. Construction is holding up better than expected and, with credit easing, should pick up by year end. In all, bleak-winter despair has turned to fair weather optimism. But it is a cautious optimism. Some business indicators, an alarming number to many observers, continue pointing down. Many soft spots remain, and the optimists are counting as much on predicted improvements as they are on current performance. But on balance, it looks as though 1960 will still be a very good business year.

Capital spending plans, key advance indicator of business activity, remain high. Although the latest Department of Commerce survey, released a week and a half ago, indicates a slight downward revision of spending plans, "the current survey does not reveal any significant changes in the total capital programs of business for 1960," the Commerce Department announced. Spending for new plant and equipment, as expected, reached a $33 billion-a-year rate in the first quarter, according to government count. By the third quarter, capital spending will reach a $37.5 billion annual rate, the Commerce Department now believes, and total capital outlays for the year should be $36.8 billion—only $200 million below its earlier estimate.

"But where, oh where, are the new orders for machinery," capital goods producers are asking? Latest count by McGraw-Hill Economics, taken in mid-May, showed April orders were dragging along 7% behind year-ago levels (chart above). But a pickup is due in the next few months. Manufacturers expect a record rush of orders by the third quarter, the survey showed. At that time, the Index of New Orders should peak at an unprecedented 196, on a seasonally adjusted basis. It stood at 169 in the first quarter.



Power Statistics

		Latest Month	Year Ago	Annual Change %
Capacity	Mar.	158.73	145.63	9.0
Dec. '59 Peak ... million kw		121.6	113.5	7.1
Est. Dec. '60 Peak	Mar.	133.7	134.4	−0.5
Production—billion kwhr	Mar.	64.30	58.35	10.2
Hydro		13.29	12.02	10.6
Fuel		51.01	46.33	10.1
Sales—billion kwhr	Mar.	58.03	53.30	8.9
Residential		17.75	15.80	12.3
Commercial		9.34	8.50	9.9
Industrial		27.87	26.12	6.7
Other		3.08	2.88	6.9
Fuel Consumption	Mar.			
Coal—million tons		16.33	14.60	11.8
Oil—million barrels		8.36	8.58	−2.6
Gas—billion cu ft		107.49	101.00	6.4
Net Income Class A & B Co's—$ million	Mar.	162.88	148.55	9.6
Residential Customers—millions	12 mos.	49.19	48.01	2.5
Revenue per kwhr	ended	2.49¢	2.52¢	−1.2
Avg kwhr per customer	Mar. 31	3,647	3,417	6.7
Avg annual bill		$90.81	$86.11	5.5

Business Statistics

Indexes: 1947–49 = 100				
FRB Industrial Production	Apr.	166	163	1.8
ENR Construction Cost	June	173.2	166.7	3.9
BLS Cost-of-living	Apr.	126.2	123.9	1.9
New Orders for Machinery (1950 = 100)	Apr.	177	192	−7.8
NEMA Sales				
Insulation materials	Mar.	168	152	10.5
Electric appliances		110	117	−6.0
Wholesale prices				
Motors and generators	Mar.	146.6	146.4	0.1
Transformers and regulators		145.4	148.8	−2.3
Switchgear and fuses		175.5	173.6	1.1
GNP—annual rate—$ billion	1st qtr.	498.0	470.4	5.9

Significant changes: Appliance sales continue to disappoint the manufacturers. Factory inventories of appliances in May were the highest to date. Price cutting is common at retail outlets.

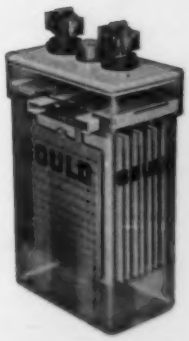
Now—Gould Stationary Batteries in Plastrite Jars withstand MORE HEAT THAN EVER WITHOUT DAMAGE!

They will not warp, bulge, or lose shape in the sun or extremely high room temperatures. The Plastrite Jars have 50% higher elongation characteristics, 15-30% higher resistance to heat distortion than other stationary battery jars.

Save space. Gould's new Stationary Batteries in Plastrite Jars save you 30-40% more floor space; this means you can increase your battery room capacity without increasing the room size. Lightweight Plastrite Jars have great impact resistance, are unharmed by normal handling and shipment.

Defy electrolyte seepage. New Silicone O-ring post seal expands under compression, prevents escape of electrolyte. New stronger posts assure full current carrying capacity. Improved element suspension eliminates cover breakage due to weight of battery element.

Gould Stationary Batteries in Plastrite Jars are available in Planté, Calcium, or Kathanode. Write for details today, or call your local Gould office listed under "Batteries—Industrial" in the Yellow Pages. Gould-National Batteries, Inc., Trenton 7, N.J. *IN CANADA, WRITE TO GOULD-NATIONAL BATTERIES OF CANADA, LTD., 1819 YONGE STREET, TORONTO, ONTARIO.*



New Stationary Batteries in Plastrite Jars offer the same long life for which Gould has always been famous.

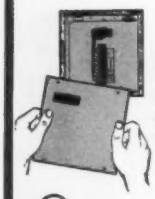
More Power to you from **GOULD**

GTC

UNITIZED
COMMUNICATION EQUIPMENT for POWER and INDUSTRY

Effective! Reliable! Economical!

1 Highly effective in extremes of ambient noise and temperature.



2 Plug-in units provide ease of installation, expansion and maintenance.

3 Transistors and rugged, industrial type components used throughout.

4 Central control cabinet, costly engineering and fabrication eliminated.

Wherever a highly dependable, voice communication system for use in high noise level areas is needed—you'll find GAI-TRONICS specified by name.

GTC is extremely flexible in application. Write today for a copy of our completely illustrated, descriptive booklet and name of nearest representative.

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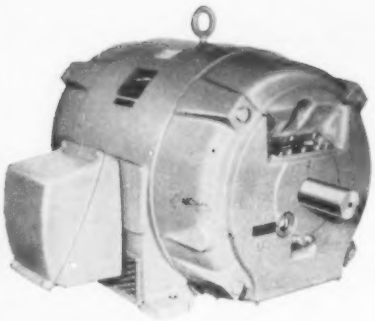
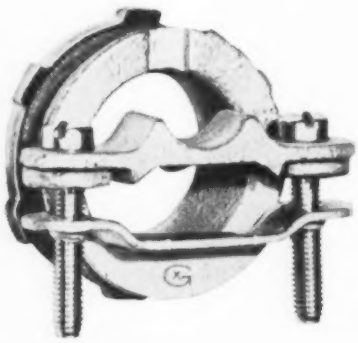


Motors . . .

. . . of 40 to 250 hp are furnished in three basic NEMA designs for various power plant purposes. The squirrel-cage Life-Line A motors have end brackets that provide drip-proof protection. Oil-lubricated bearings are grooved and have extra large oil rings for best lubrication. **Westinghouse Electric Corp, Box 2099, Pittsburgh 30, Pa.**

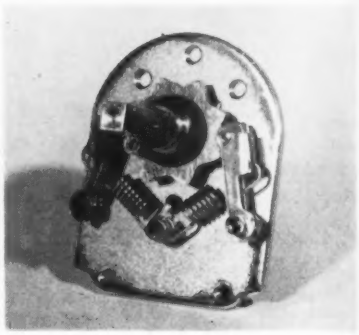


Connectors . . .

. . . of malleable iron are for armored cable, flexible conduit, service entrance and other cables. Selecting from three types permits accommodating round or oval conductors of 0.218-1.290 in. OD. **Gedney Electric Co, 1270 6th Ave, New York, N. Y.**

Computing System . . .

. . . for accounting offers a full line of peripheral units. These operate on-line, but a program interrupt feature provides the advantages of off-line computer arrangements. Solid-state Univac III offers memories of up to 32,768 27-bit words. Access time is 4½ μsec. Input can be by punched cards at 700 per min or by magnetic tape. The computer gives the same types of outputs besides offering a 700-lines-per-min printer. **Remington Rand, 315 Fourth Ave, New York 10, N. Y.**

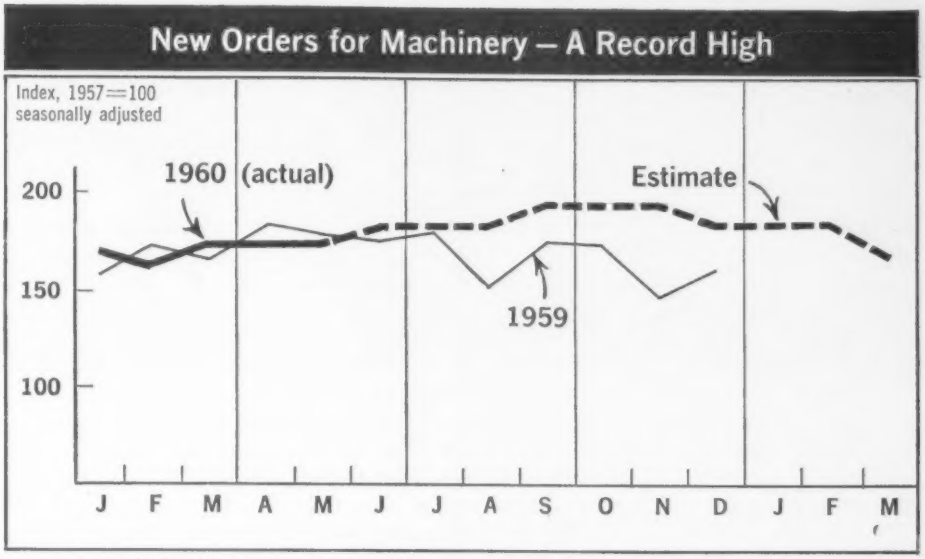


Control Switch . . .

. . . has this positive positioning device, which prevents hanging up between positions and overshooting. Positive positioning, with snap action that lets the operator feel switch action, eliminates arcing, burning and excessive wear of contacts. Type 210 switches are also installed with instruments. **Allis-Chalmers Mfg Co, Milwaukee 1, Wis.**

Backhoe . . .

. . . attachment snaps on or off a tractor shovel in less than a minute without tools. Snap-Mount backhoe swings in a 180-deg continuous arc and its bucket tilts 180 deg. It reaches 15 ft 6 in. from pivot and digs 12 ft 4 in. Its breakaway capacity at the bucket teeth is 5 tons. **Clark Equipment Co, Pipestone Rd, Benton Harbor, Mich.**



Source: McGraw-Hill Department of Economics

Stronger Sales Lift Business Hopes

Report on
Electrical Business Outlook

Businessmen now are a lot less apprehensive about prospects for this year than they were a few months ago. Capital spending plans are running on schedule and still show strength. New orders for machinery, now low, promise a dramatic pickup to record levels. Construction is holding up better than expected and, with credit easing, should pick up by year end. In all, bleak-winter despair has turned to fair weather optimism. But it is a cautious optimism. Some business indicators, an alarming number to many observers, continue pointing down. Many soft spots remain, and the optimists are counting as much on predicted improvements as they are on current performance. But on balance, it looks as though 1960 will still be a very good business year.

Capital spending plans, key advance indicator of business activity, remain high. Although the latest Department of Commerce survey, released a week and a half ago, indicates a slight downward revision of spending plans, "the current survey does not reveal any significant changes in the total capital programs of business for 1960," the Commerce Department announced. Spending for new plant and equipment, as expected, reached a $33 billion-a-year rate in the first quarter, according to government count. By the third quarter, capital spending will reach a $37.5 billion annual rate, the Commerce Department now believes, and total capital outlays for the year should be $36.8 billion—only $200 million below its earlier estimate.

"But where, oh where, are the new orders for machinery," capital goods producers are asking? Latest count by McGraw-Hill Economics, taken in mid-May, showed April orders were dragging along 7% behind year-ago levels (chart above). But a pickup is due in the next few months. Manufacturers expect a record rush of orders by the third quarter, the survey showed. At that time, the Index of New Orders should peak at an unprecedented 196, on a seasonally adjusted basis. It stood at 169 in the first quarter.

The construction outlook is brightening, although building declined more than seasonally between February and April, according to latest Commerce Department estimates. But new contract awards are high. F. W. Dodge Corp's compilation of construction contracts rose over 35% between March and April. And **Engineering News Record's** compilation of heavy construction contracts has also been at near-record levels since April.

Residential housing, restrained by tight money policies, should rise, along with all construction, by year-end. Partly, the rise will reflect credit easing by the Federal Reserve Board. But the effect is not likely to be felt before fall, at the earliest. It will take builders at least that long to revise their plans. Residential building is now running about 15% below last year's levels. The decline, however, was fully expected by the building industry when credit was tightened last fall. As a matter of fact, spending on new housing has held up considerably better than most construction experts had forecast.

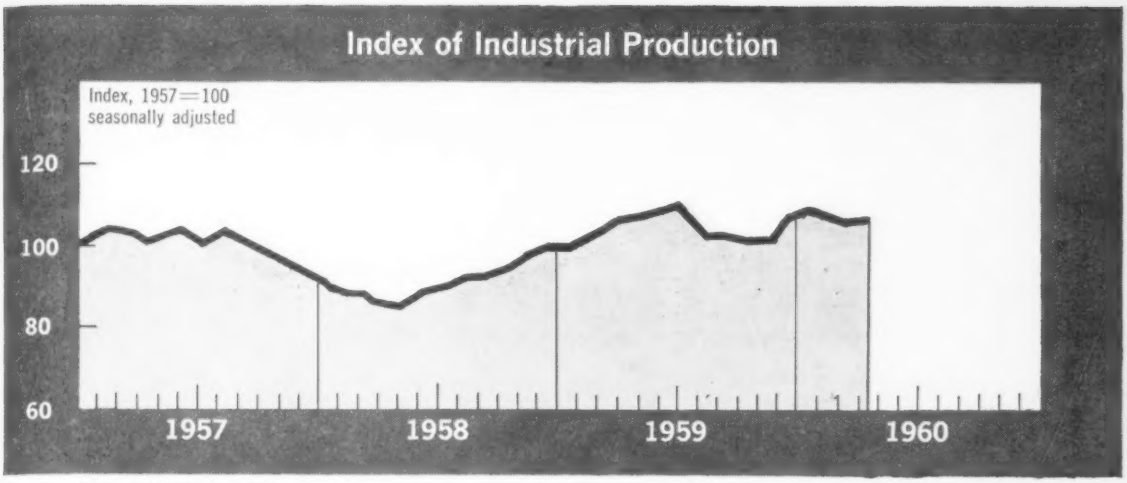
Overall, the economy has continued to advance. As expected, Gross National Product (the total value of all goods and services produced) edged slightly past the $500 billion mark in the first quarter, on an annual, seasonally adjusted basis; a quarterly gain of about $16.2 billion. About half the increase was due to very heavy inventory accumulation after the steel mills reopened; the remainder to stepped up final demand for goods and services.

The tremendous and unsustainable rush to build up inventories in January has been the chief business depressant thus far. Restocking was going on at a $900 million monthly rate in January, seasonally adjusted. At that pace, it was only a matter of time until activity slowed down. Restocking declined in February to a $600 million monthly rate, and slid still further in March to $400 million. Latest figures show the decline continued into April, when businessmen added only $300 million to their inventories. That doesn't mean business inventories are being cut today; only that they're being increased at a much slower rate. The current annual rate, $3.6 billion, is sustainable, and about normal for a period of rising sales.

Brisk spring sales, more than any other factor, have been responsible for lifting business hopes. Consumers poured into retail stores in April, pushing sales upward more than seasonally, a 3% gain over April '59. Consumers backed out just as quickly in May however, leaving merchants with sales for that month down from year ago levels. Retailers say they expect a better June showing.

People are better off than ever, and in good shape to buy. Personal income, at an all-time high, rose to $397.4 billion in April, up $3.4 billion from a month earlier and a full $18.4 billion ahead of April 1959. May employment figures were the most encouraging of the year, with 67,208,000 people at work; 1.2 million more than a year ago. Unemployment in May was the lowest for the year, and the average factory work week turned up slightly to 39.8 hours. The May employment figures are higher than normal, even for a year of prosperity. But unemployment, at 4.9% of the workforce, can't be tossed off lightly.

New autos have been selling very well, even though deliveries don't nearly match Detroit's optimistic predictions of late last year. Sales for the first five months, at 2,660,000, are 13% ahead of 1959. April was the peak month for sales, when 570,000 new units were delivered. But sales in May were down slightly. May in fact, showed the smallest advance over 1959 levels of any month this year. The industry remains optimistic, still expects 1960 to be its second or third best sales year in history, with total deliveries of 6.2 or 6.3 million. That's far short of the bonanza year, 1955, when 7.2 million autos were sold. But it's close to the second best year on record, 1950, when 6.3 million new cars moved through the showrooms.



Source: Federal Reserve Board

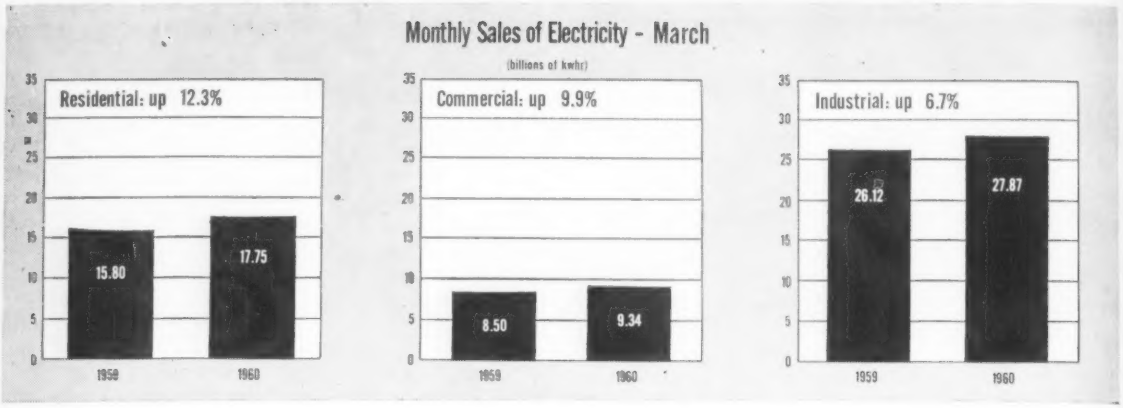
Incidentally, as a measure of 1960 consumer buying attitudes, don't overlook the imports. They're now selling at about 600,000 a year. U. S. sales figures don't include them. Add the imports to sales of U. S. makes, and you have 6.8 million new car deliveries this year. The big year, 1955, saw only 60,000 imported autos sold in this country.

Steel production, cause for many furrowed brows, has been slipping every month since the turn of the year. At 96.3% of capacity in January, output slipped to around 62% of capacity by the beginning of June. And there's no upturn in sight, at least for the next month or so, according to steel observers. If you believe some estimates, output may dip as low as 50% of capacity this year before the turnaround. On June 8, Roger M. Blough, Chairman of U. S. Steel Corp., predicted that, "the operating rate won't go much below where it is now, give or take five percentage points." Present consumption, Blough believed, could support a 70% to 75% production rate if manufacturers stopped their inventory liquidations. Steel's big test will come in August, when the auto makers begin buying material for their 1961 model runs.

Despite steel's mediocre showing, however, the Index of Industrial Production continues to hold the line. The April figure, seasonally adjusted, repeated its March performance. This shows relative strength in overall production, despite a 3% reduction in auto output for the month, and a 12% cutback in steel. Steel and autos have about a 6% and 5% weight in the index, respectively. Thus, a modest gain was needed in other areas of industry to make up for steel and auto declines.

If sales and production aren't quite what they might be, investors are betting that easier credit will furnish the extra impetus to put 1960 on solid ground. On June 3, the Federal Reserve Board authorized a cut in the discount rate to 3½%. It had been at 4% since last September. The news touched off a traditional rally on Wall Street. It was, in fact, the strongest weekly rally in three and a half years, as the **New York Times** Combined 50-Stock Average soared 12.63 points for the five-day session ending June 10. This was read by many as a resounding vote of confidence for the market and the economy as well.

The Outlook—the economy, on balance, is gaining strength. In GNP terms, business will move up at a moderate pace to higher ground through this summer and fall. Result: 1960 won't be the "hum-dinger" widely hoped for. But it still looks like a mighty good year—better, in fact, than any to date.



Power Statistics

		Latest Month	Year Ago	Annual Change %
Capacity	Mar.	158.73	145.63	9.0
Dec. '59 Peak ... million kw		121.6	113.5	7.1
Est. Dec. '60 Peak	Mar.	133.7	134.4	−0.5
Production—billion kwhr	Mar.	64.30	58.35	10.2
Hydro		13.29	12.02	10.6
Fuel		51.01	46.33	10.1
Sales—billion kwhr	Mar.	58.03	53.30	8.9
Residential		17.75	15.80	12.3
Commercial		9.34	8.50	9.9
Industrial		27.87	26.12	6.7
Other		3.08	2.88	6.9
Fuel Consumption	Mar.			
Coal—million tons		16.33	14.60	11.8
Oil—million barrels		8.36	8.58	−2.6
Gas—billion cu ft		107.49	101.00	6.4
Net Income Class A & B Co's—$ million	Mar.	162.88	148.55	9.6
Residential Customers—millions	12 mos.	49.19	48.01	2.5
Revenue per kwhr	ended	2.49¢	2.52¢	−1.2
Avg kwhr per customer	Mar. 31	3,647	3,417	6.7
Avg annual bill		$90.81	$86.11	5.5

Business Statistics

Indexes: 1947–49 = 100				
FRB Industrial Production	Apr.	166	163	1.8
ENR Construction Cost	June	173.2	166.7	3.9
BLS Cost-of-living	Apr.	126.2	123.9	1.9
New Orders for Machinery (1950 = 100)	Apr.	177	192	−7.8
NEMA Sales				
Insulation materials	Mar.	168	152	10.5
Electric appliances		110	117	−6.0
Wholesale prices				
Motors and generators	Mar.	146.6	146.4	0.1
Transformers and regulators		145.4	148.8	−2.3
Switchgear and fuses		175.5	173.6	1.1
GNP—annual rate—$ billion	1st qtr.	498.0	470.4	5.9

Significant changes: Appliance sales continue to disappoint the manufacturers. Factory inventories of appliances in May were the highest to date. Price cutting is common at retail outlets.

Now — Gould Stationary Batteries in Plastrite Jars withstand MORE HEAT THAN EVER WITHOUT DAMAGE!

They will not warp, bulge, or lose shape in the sun or extremely high room temperatures. The Plastrite Jars have 50% higher elongation characteristics, 15-30% higher resistance to heat distortion than other stationary battery jars.

Save space. Gould's new Stationary Batteries in Plastrite Jars save you 30-40% more floor space; this means you can increase your battery room capacity without increasing the room size. Lightweight Plastrite Jars have great impact resistance, are unharmed by normal handling and shipment.

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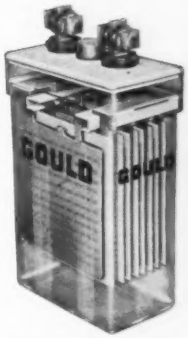

New Stationary Batteries in Plastrite Jars offer the same long life for which Gould has always been famous.

More Power to you from **GOULD**

CL&P, Detroit Ed Win Street Lighting Prizes

Detroit Edison Co and Connecticut Light & Power Co have received awards from *Reader's Digest* magazine for excellence in street lighting programming.

Detroit Edison was cited as the nation's outstanding utility in the development of safe street and highway lighting. CL&P was honored for its part in helping Rockville, Conn., to develop a program which made the town one of the nation's "safest after dark."

The Detroit utility, which planned, developed and installed modernized lighting for six of the 15 incorporated cities and towns in the country meeting the safety code of the American Standards Assn, has been given a *Reader's Digest* Public Service Award for its accomplishments.

The City of Detroit was also cited for its "continued and progressive leadership" in the modernization of urban lighting. A continuing program of street lighting modernization was accelerated by the Mayor and City Council of Detroit last year. Ten problem areas, scene of the many night-time crimes, were selected in a three-part program which included brighter luminaire and improved refractors, spacing of lighting even closer than required under the Association code, and complete trimming of trees below a height of 26 ft.

The first ten problem areas will be completed in August, when another ten will be selected for modernization. Plans are in the works for expenditure of $3.5 million over the next 10 years for street and highway relighting.

The Detroit Police Department reported that there were crime decreases ranging from 15% to 40% in the first three areas re-lighted.

Highland Park, Mich. was the first city in the country to meet the ASA code requirements. When its lighting was modernized, alley lights also were installed, with the result that hold-ups have been virtually eliminated.

To show off the results of the lighting programs, the *Digest* took city officials, civic leaders and newsmen on a night-fall aerial inspection tour.

Awards were accepted by Detroit Edison President Walker Cisler and Detroit Mayor Louis C. Miriani. Each was presented with a check for $250 for his favorite charity.

For the Rockville, Conn., relighting program, Mayor Leo Flaherty and Police Chief Peter J. Dowgewicz were honored with a *Reader's Digest* Public Service Award and a $500 check for the community.

Alfred M. Wade, sales vice president of the Connecticut Light & Power Co said, "Street lighting is more profitable to us from a public relations standpoint than from a strict net revenue basis. To us it is a builder of good public relations, it prevents crime and accidents. It increases business and civic pride and it makes communities more attractive places in which to live."

Dowgewicz agreed. "Good street lighting is one of our most effective deterrents to crime and traffic accidents," he said.

(*Continued on page* 184)

CONNECTICUT OFFICIALS honored are (l to r) Police Captain Dowgewicz and Mayor Flaherty, of Rockville, Conn; R. E. Boian, Reader's Digest, and A. M. Wade, CL&P.

DETROIT MEN honored for street lighting program are (l to r) Detroit Mayor Miriani and Detroit Ed President Walker Cisler. C. Helper of Digest (right) presents award

New G&W "Off-the-shelf" shipping system

means faster deliveries; reduced installation costs on potheads and oil fuse cutouts!

Orders received in the morning at G&W are often on their way to you the same afternoon. There's no time wasted in getting standard G&W Capnut and Sodertite Potheads and Oil Fuse Cutouts you need to meet most installation requirements.

G&W's new "Off-the-shelf" shipping system is unique and fast. Components of given assemblies are gathered from stock, checked, crated, and sent on their way. When you receive equipment in component form, your installation costs are minimized because you avoid needless disassembly time before the unit is installed.

This new shipping system is typical of improvements being made in G&W services. It is another example of why it pays you to rely on the acceptance, dependability, and quality standards that have made G&W specialists in the electric-power market. There is a pride of craftmanship in every product produced and attention given to detail is unexcelled in the industry. Thorough and precise workmanship means all the difference between years of trouble-free operation and the irritating and costly failures caused by inferior design and poor quality.

Look to G&W for all your cable accessory and switching needs. Contact a G&W Representative to answer your questions; or write us for full information.

G&W ELECTRIC SPECIALTY COMPANY

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"Superforms* help me get better results for my clients" ...CONSULTING ENGINEER

"It's my responsibility to get the best possible results for my clients . . . the most for their T&D construction dollars . . . installations that will stand up under severest conditions, over long periods of time. Fanner Superformed products help me meet these requirements."

More and more Consulting Engineers are making Superforms a standard in their specifications. A-1601A

FANNER
Superformed* with a
"PROTECTIVE TWIST"

ARMOR RODS...
Protect long-span T&D lines at supports

LINEGUARDS...
Protect short-span T&D lines at supports

PATCH RODS...
Repair damaged conductors

TAP ARMOR...
Protects conductor at tapping points

FANNGRIPS...
For dead-ending strands and conductors

FANNSPLICES...
Join two ends of conductor wire

PLASTIC PRODUCTS...
For conductor surface protection

FANNER
The Fanner Manufacturing Co.
Brookside Park—Cleveland 9, Ohio
Division of Textron, Inc.

Street Lighting

(*Continued from page* 182)

Flaherty praised the Rockville street lighting program as one which has "given us new civic pride, raised our property values, increased our business potential and provided us all with a new feeling of well-being, protection and security."

Noting that although Rockville is only one mile square, Flaherty said that because of the good street lighting a shopping center moved right into the center of the city to take advantage of the parking area and main business section which were bathed in fluorescent light. "Good street lighting can help increase business activity. Poor street lighting can only hurt it," he said.

Guests of honor at the award luncheon included Sherman R. Knapp, president of Connecticut Light & Power Co, and Edmund Powers, educational director of the Street & Highway Safety Lighting Bureau.

The General Federation of Women's Clubs in Cleveland, and the City of Chicago received similar awards from the *Digest*.

NEES Institutes Special Electric Heating Rate

A special rate for electrically heated homes or apartment buildings has been instituted by the 10 companies making up the New England Electric System.

The new rate provides a fixed $10.50 a month for the first 400 kwhr, with excess billed at 2.05 cents per kwhr. With the current fuel adjustment rate it will make the cost of power less than 2¢.

The new rate requires that the user be a continuous house heat customer throughout the year. This eliminates owners of summer homes from the special heating rate.

The State Department of Public Utilities also approved a provision of the rate request filed by the utilities which makes it mandatory that any new customer receiving the special Class B house heating rate continue as a house heating customer for at least 12 consecutive months. After the customer has been a continuous user for 12 months, the service can be terminated at any time without liability for any charges beyond the month of termination.

Once a customer terminates the agreement however he will be treated as a new customer on resuming purchase of house heating at the special rate.

The companies covered by the new rate are: Attleboro Electric Co; Lynn Gas & Electric Co; Merrimack-Essex Electric Co; Northampton Electric Lighting Co; Northern Berkshire Electric Co; Quincy Electric Co; Southern Berkshire Power & Electric Co; Suburban Electric Co; Weymouth Light & Power Co; and Worcester County Electric Co.

Appliance Sales Lagging, Financial World Discovers

Appliance sales are just not perking up the way they had been expected to this year. In the beginning estimates were that the market would show a 10-15% increase this year. Today, most appliance manufacturers will be satisfied if there is a 5% gain this year. Some don't even expect better sales than last year. These are the conclusions of an article in *Financial World* magazine, titled "Glut Appears in Household Appliances."

Main reason, according to the magazine: The consumer seems in no hurry to purchase appliances. Though, the article, says adverse weather in February and March, and the lag in housing starts had something to do with the languid sales.

Another factor contributing to the sales lag is the fact that to overcome high inventories retail prices have been shaved. To date the only effect this has had on the consumer is to make him wait for perhaps a further cut in price.

The appliances with the highest saturation are affected most. Refrigerators, ranges, vacuum cleaners, radio and TV sets fall in this category. Most small appliances are plentiful. However, freezers, clothes dryers, ironers, and air conditioners are selling better.

The article points out that the manufacturers who depend greatly on appliances for profits are suffering the most. Those with lines diversified into other industries are making out better.

With disposable income mount-

ing, the article predicts there will be a revival in appliance demand across the country.

Low-cost Wiring Offered by Commonwealth Edison

Chicago area homeowners are currently being offered wiring installations at bargain prices by Commonwealth Edison Co. The low-cost wiring package is available with any electric range, clothes dryer or uncontrolled water heater to be installed in the Commonwealth Edison system.

Price is $29.95 for additional wiring needed to operate any of the specified 240-v appliances. Offer applies to most installations in single-family residences served by Commonwealth Ed.

Normal rewiring improvements necessary to provide service for a 240-v appliance are covered in the special price. Where required, such improvements include a new service entrance, 100-amp switch, and the appliance circuit. The single price covers wiring needed for built-in electric range and oven units.

Appliance dealers and electrical contractors throughout the utility's territory are cooperating in the wiring offer.

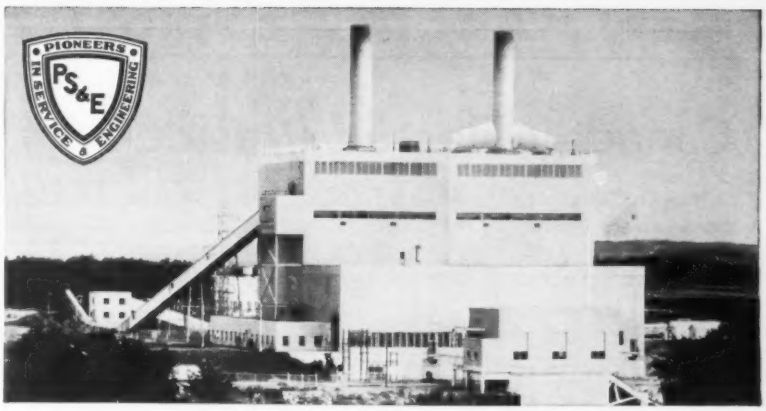
Slide Presentation Aids Kitchen Planning

"Mrs Tilley and Her Lemon Pie Kitchen," a kitchen-planning slide presentation, is available from Edison Electric Institute.

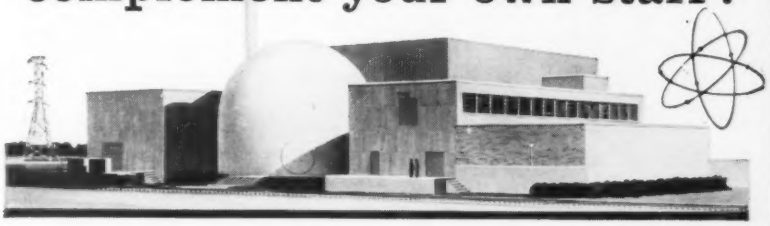
In addition to a slide discussion of kitchen planning, the kit also covers Housepower and correct kitchen lighting.

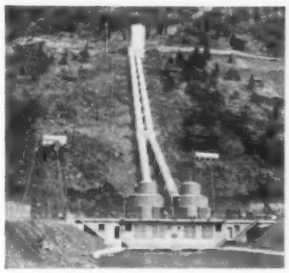
The kit is designed for home economics classes, builders and building contractors, women's groups, dealers and distributors, adult education classes, and architects.

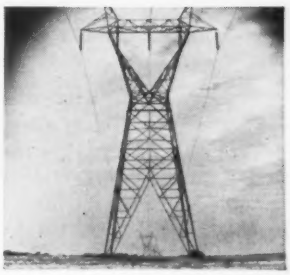
The Kitchen Planning Package contains fifty-one 2x2-in. color slides, a script and a Teacher's Guide. Price: $35, EEI members, $40, non-members. Address: Sales Division, Edison Electric Institute, 750 Third Avenue, New York 17, N.Y.



Which Pioneer service do you need to complement your own staff?







DESIGN AND CONSULTING ENGINEERING SERVICES

Pioneer specializes in designing power plants and offers design service for fossil fuel, hydro and atomic plants. It will also assist in forecasting load growth, in site selection, in purchasing and expediting of equipment and construction management. Pioneer's other services include substation, transmission and distribution studies and design.

SERVICES IN REGULATORY MATTERS

Pioneer offers its services in all phases of Federal, State and local utility regulation, including natural gas and electric rate matters, certificate proceedings, licensed project accounting requirements, depreciation studies for rate case and income tax purposes, cost allocations and special studies.

CORPORATE SERVICES

Pioneer offers its services as business and management consultants; stock transfer and dividend disbursing agents; financial, accounting and tax consultants.

Write for Booklet "PIONEERING NEW HORIZONS IN POWER"

Serving Electric Utilities and Industrial Power Users Since 1902

Pioneer Service & Engineering Co.

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Canaday Elected President of AP&L

Paul O. Canaday has been elected president of Arkansas Power & Light Co, the fourth man to head the utility. He succeeds Robert E. Ritchie who has been re-elected chairman of the board and chairman of the executive committee. Reeves Ritchie was promoted to vice president.

CANADAY

A 34-year veteran of the electric power industry, Canaday spent 12 years with the Tennessee Public Service Co, serving in various engineering and management positions. Leaving Knoxville in 1938, he worked as a utility consultant in New York City for six years. He has been affiliated with AP&L since 1944, and had been executive vice president since 1958.

Reeves Ritchie started with the company 23 years ago. From 1945-51 he served as assistant personnel director in Pine Bluff. After working from 1951 to 1958 as assistant to the Central Division manager in Pine Bluff, he was promoted to personnel director, a post he will continue to hold.

REEVES RITCHIE

Smith Named Vice President-Sales

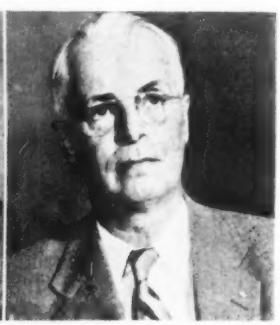
Fred I. Smith has been named vice president of sales for Jersey Central Power & Light Co and New Jersey Power & Light Co. The former general sales manager, he has been directing the operations of the JCP&L-NJP&L combined sales department for the past year.

Smith joined JCP&L in 1946 as a power engineer, coming from the Pennsylvania Electric Co. He was promoted to power sales manager in 1947, became sales manager for JCP&L in 1951, and manager of industrial and commercial sales for both companies in 1957.

Norman Foy has been appointed sales manager of the two companies, and Edward L. Jones has been named to succeed Foy as sales manager of the Bay Division.

Electric Storage Battery Elects Two Vice Presidents

MOORE



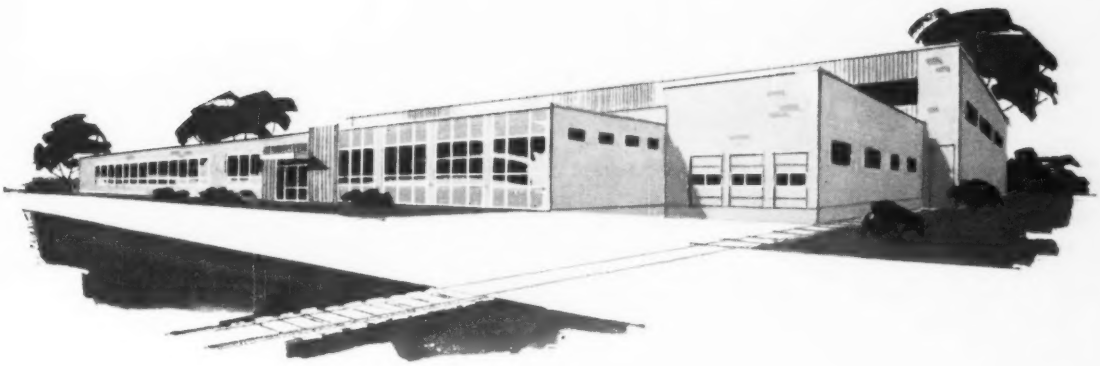
WELLS

C. J. Moore has been promoted to vice president-marketing, and Leland E. Wells, vice president-engineering, at Electric Storage Battery Co's Exide Industrial Division.

Moore joined Exide in 1935 as a salesman in the Pittsburgh branch. He later became manager of the Railway and Motive Power Sales Division, and then became sales manager, and general sales and marketing manager. Wells is the former director of engineering, director of research and engineering, and chief engineer. He was chief engineer of Willard Storage Battery Co, now an Exide subsidiary, before becoming chief engineer of the parent company in 1950.

(*More News About People on page* 188)

PRECISION
is "bustin' out all over"



PRECISION TRANSFORMER CORP.'S new 50,000 square foot modern production plant now under construction in Centex Industrial Park, Elk Grove Village, Ill.

The bright, warm month of June... and Precision Transformer Corp... are both bustin' out all over. We've outgrown our present quarters in Chicago, and are now building a spanking modern plant, custom-designed for the manufacture of transformers . . . in the Chicago suburb of Elk Grove Village. When we move into our new home in October, we'll have twice the production area and capacity . . . with streamlined, semi-automated assembly lines we'll be much better able to meet the transformer requirements of contractors and suppliers to industry, communities, government . . . for a wide variety of dry-type and liquid-filled transformers ranging in size from 5 to 10,000 KVA. The prospects of "bustin' out" into a new plant reflect a remarkable recovery for our company which experienced a disasterous fire only 18 months ago. To our many customers we extend our heartfelt appreciation, for their loyalty which made possible Precision Transformer Corp's rapid recovery and forward progress.

PTC
TRANSFORMERS
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• DEPENDABLE

PRECISION TRANSFORMER CORP.
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Representatives in all principal cities

Indianapolis Power & Light Co has made **Robert W. Gausmann** chief planning engineer; **Allen A. Benson,** chief mechanical engineer; **Charles F. Fetters,** supervisor of the mechanical-civil engineering department; **A. W. Funkhouser,** supervisor, system planning department; **Z. G. Todd,** supervisor, Electric System Planning Division; **Tony Offenbacker,** supervisor, system engineering department; **John H. Smale,** supervisor, Substation Design Engineering Division; **Carl B. Vance,** assistant to the vice-president, production; **M. L. Swinehart,** superintendent of power production; **Don E. Blue,** assistant to superintendent of power production; **John E. Davis,** supervisor of the Plant Research Division; **Harry K. Keller,** assistant manager of the rates and statistics department; and **James M. Zoercher,** supervisor of the Rate Application Division.

L. J. Evans has assumed new duties as management representative in public relations and related special assignments at Public Service Co of Indiana.

Cheyenne Light Fuel & Power Co has made the following changes: **L. J. Weber** has assumed the superintendent's position with the Boulder Division of Public Service Co of Colorado. **G. R. Peel** replaces him as superintendent of its affiliate, Cheyenne Light Fuel & Power Co. **Kenneth B. Levengood** has been transferred to Cheyenne, filling the vacancy caused by the recent death of **W. J. Quinn.**

Duane Arnold, vice president and general manager of Iowa Electric Light & Power Co, has been elected to the board.

R. R. Murdock has been appointed assistant to the chairman of the board and president of Duquesne Light Co.

George B. Catlin has been named director of area development for Detroit Edison Co.

Mississippi Power & Light Co has named: **Earle B. Guess,** assistant to the Central Division manager at Jackson; **Frank G. Smith Jr,** Southern Division manager; **Alex Mckeigney,** executive assistant in the executive department; and **Robert E. Enlow,** director of advertising and sales promotion. **J. M. Stedman,** former general sales manager of Pennsylvania Power & Light Co, has been retained by Mississippi Power & Light as a consultant to the sales department in marketing, sales promotion, and training.

Philip Sporn, president of American Electric Power Co, has been presented the annual Conservation Service Award by the US Department of Interior in recognition of the valuable service he has rendered as a proponent of conservation of fuels of the United States.

Wesley W. Blish, advertising manager of Wisconsin Electric Power Co, has been named secretary of the Public Utilities Advertising Assn.

Lawrence L. Gann has been elected assistant secretary and assistant treasurer of Colorado Central Power Co.

Alfred H. Doud has been appointed director of public relations of Rochester Gas & Electric Co.

John S. Anderson has been promoted to superintendent of power at Utah Power & Light Co. **J. C. Conder** has been named steam production supervisor.

E. O. George, vice president, Detroit Edison Co, and **R. A. Gibson,** president, Hartford Electric Light Co, have been named directors of Reddy Kilowatt, Inc.

Wayne A. Parker has become superintendent of construction at Oklahoma Gas & Electric Co. He was formerly assistant construction superintendent.

Robert J. Morris has been named assistant controller of the Columbus & Southern Ohio Electric Co.

John K. Williams has been appointed assistant director for public relations in the Electro-Motive Division, General Motors Corp.

Denver Division, Hathaway Instruments, Inc, has appointed **Wallace G. Thomson,** general sales manager, and **Donald L. Thomas,** comptroller.

James L. Vincent has been elected secretary and treasurer of the Anaconda Wire & Cable Co.

J. W. Loveland has been named assistant general sales manager of the Electrical Conductor Division, Kaiser Aluminum & Chemical Sales, Inc. **W. W. Hicks** succeeds him as electrical conductor sales manager in the Northeastern region.

I-T-E Circuit Breaker Co has made **William P. Bolger,** manager of the Special Products Division. **W. Harold Edmunds** succeeds him as manager of the Small Circuit Breaker Division.

Thor Power Tool Co has named **Peter Rebechini** chief engineer of the Aurora Works.

Motorola Communications & Electronics, Inc, has named **Wallace P. Miller,** manager of two-way radio sales for the Midwestern states.

Rockbestos Wire & Cable Co has made **John P. Kingman** government representative with headquarters in Washington, D. C., for the Division of Cerro de Pasco Corp.

Radio Corp of America has appointed **Edward O. Johnson** chief engineer, Semiconductor and Materials Division.

Kennecott Copper Corp has appointed **Robert H. Lounsbury** general counsel.

James DeKiep, engineering vice president of Electric Machinery Mfg Co, has been appointed chairman of the American Standards Assn C-50 Committee.

Line Material Industries has promoted **William S. Kingsolver** to market-manager-commercial lighting.

Sperry Rand Corp has made **Joel M. Kibbee** manager of customer educational services of the Remington Rand Univac Division.

Edward H. Reed has been named manager of the new railroad and industrial lighting sales department at Revere Electric Manufacturing Co.

Harold J. Jungbluth, general manager of RT&E Corp, has been elected vice president for the third district of the National Assn of Purchasing Agents.

Harry Pearson, former distribution engineer for Portland General Electric Co, has joined Rogers Engineering Inc, to take an assignment in Bangkok, Thailand, where he will handle distribution engineering in an ECA program to rebuild a portion of the Siamese capital.

International Business Machines Corp has appointed **Dr David Sayre,** manager of programming planning. **Horace W. Thue** has been named assistant general manager in charge of manufacturing for the General Products and Data Systems Division.

Taylor Fibre Co has appointed **Edward J. Guelpa,** general manager of the Western Division, replacing **Milton F. Chapel,** who resigned.

James S. Holtzinger has become president of Esco of Iowa Corp.

OBITUARY

Ernest Sherman Fitz, 70, retired vice president of Virginia Electric & Power Co . . . **F. Engle Taylor Jr,** 55, manager of market development division, Philadelphia Electric Co . . . **Eugene W. Commery,** 66, former supervisor, residential lighting with the General Electric Co . . . **Richard W. Spry,** 56, an electrical engineer with Stone & Webster Engineering Corp . . . **W. J. Mandley,** 61, assistant manager of Cowlitz PUD (Washington), who coordinated the PUD's Lewis River hydroelectric development in conjunction with Pacific Power & Light Co . . . **Rose M. Greene,** home appliance demonstrator for Hartford Electric Light Co . . . **Paul V. Dimmick,** 54, district manager of Holan Corp . . . **John T. Morris,** 61, supervisor of patents and trademarks for Westinghouse Electric International Co.

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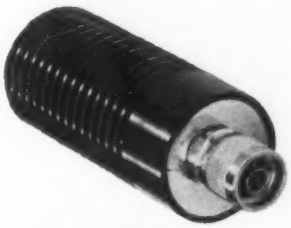
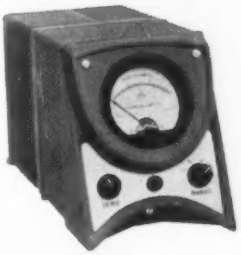


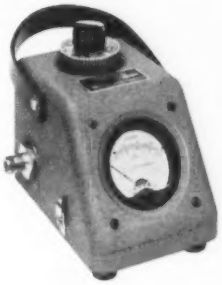
Model 160 50 ohm Coaxial Loads

Now including Models operating to 11 KMC, Sierra 160 Series low VSWR terminations may be used when stable 50 ohm loads are required. Featuring rugged design, high stability at full rated power, the loads have a typical VSWR of 1.2. All models are air-cooled and complete shielding insures personnel safety. Models with power capacities of 1, 5, and 20 watts are available with N, C and BNC connectors. 100 and 500 watt models Type N connectors. $20.00 to $170.00



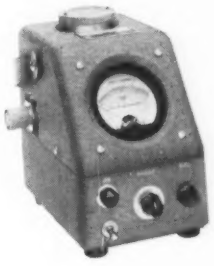
Model 185A Average-Reading Termination Wattmeters

Sierra 185A series are particularly useful in terminating rf coaxial transmission systems, measuring average powers between 20 and 1,000 MC, and as dummy loads for testing and adjusting CW and FM transmitters and oscillators. Three models with maximum power dissipation of 15, 100 and 500 watts, and power ranges of 0 to 5/15, 0 to 30/100 and 0 to 150/500 watts, respectively. Accuracy is ± 5% and VSWR is 1.2. Female Type N connectors. Model 185A-15FN, $170.00; 185A-100FN, $260.00; 185A-500FN, $315.00.



Model 164A Average Power Monitor

Sierra 164A Series Bi-Directional Power Monitors are now available with plug-ins down to 2 MC. Four plug-ins provide full scale ranges of 1, 5, 10 and 50 watts through frequencies 25 to 1000 MC. Two medium-power units provide full scale ranges 10, 50, 100 and 500 watts, 25 to 1000 MC. Two high-power units provide full scale ranges of 50, 100, 500, 1000 watts, 2 through 75 MC. Model 164 is now available with Type N, C, HN, UHF and LC connectors. Model 164, $115.00; plug-ins, $70.00 to $170.00.



Model 194A-A Bi-Directional Peak Power Monitor

Covering 200 to 1,215 MC, Sierra 194A-A Peak Power Monitor offers two important, time-saving features—peak power is read directly without computation and a reversible directional coupler permits incident or reflected power readings simply by turning one knob. Peak powers to 30 Kw are covered in 4 ranges. Measurement accuracy is ± 10% full scale at pulse widths down to 0.1 μsec or repetition rates as low as 10 pps. Minimum duty cycle 0.04% for specified accuracy. $460.00.

Data subject to change without notice.
Prices f. o. b. factory.

For complete details, see your Sierra Representative or write direct.

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1 2 3 4

1 Obtain your system characteristics: present loads, installed generation, production costs, future load growth trends; establish criteria for installed reserve.

2 Establish an expansion plan for a number of years into the future with new generation requirements being met by a sequence of base-load units only (this is called the Base-Load Plan).

3 Establish an expansion plan similar to that in Step 2 with the addition of a gas turbine peaking plant to the sequence of base-load unit additions. (This is called the Peaking Plan.)

4 Establish, on an annual basis, the capital requirements and annual production costs over the length of both the Base-Load Plan and the Peaking Plan.

Here is how Westinghouse works with you in the five-step Powercasting Plan for Peaking Analysis

WESTINGHOUSE GAS TURBINES... A NEW DIMENSION IN PEAKING POWER ECONOMICS

POWERCASTING STUDIES SHOW MINIMUM COST PEAKING UNITS REDUCE CAPITAL EXPENDITURES, CUT OPERATING COSTS

As an outgrowth of its Powercasting program for planned system expansion, Westinghouse has developed the five-step analysis shown above to determine the best economical answer to peaking problems. Studies conducted under this plan may prove that utilities can make significant savings by installing a minimum-first-cost Westinghouse gas turbine peak-

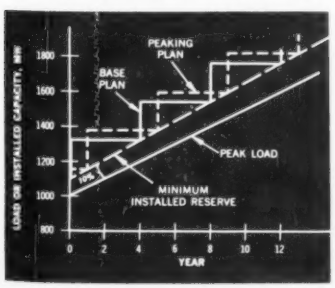
5

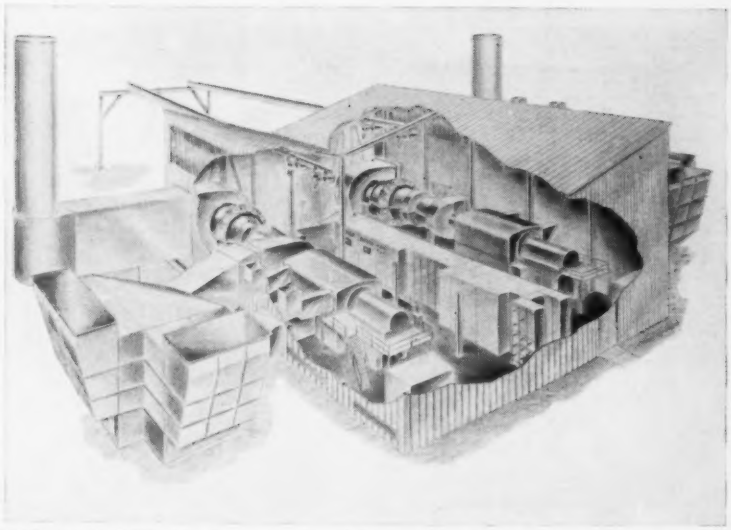
Compare costs to determine whether or not the first block of gas turbine capacity can be economically justified. Studies can be expanded in the future to determine if additional gas turbine plants are feasible.

ing unit, thereby postponing the addition of large base-load machines.

Typical Savings with a Peaking Unit

A recent Powercasting study for a utility working on a 4-year cycle





This typical Westinghouse gas turbine peaking plant, shown above, postpones capital expenditures, lowers operating costs. Westinghouse can supply all equipment for the complete installation, including buildings, with all the advantages to you of single source of supply and single responsibility.

of adding base-load machines showed that the application of gas turbines for peaking allowed them to postpone purchases of base-load equipment for an additional year. Economic comparisons revealed a potential net saving of better than $200,000 per 4-year cycle—a total saving of more than $800,000 over a 13-year period.

Three Reasons Why Gas Turbine Peaking Units Reduce Operating Costs

Besides the savings from postponing large capital outlays, the Westinghouse gas turbine peaking plant offers:

$110/kw $95/kw **Lowest Plant Cost** For example, a single-turbine peaking plant, rated at 22 mw up to an ambient temperature of 100° F, can be installed for $110/kw. At 40° F, the plant output increases to 27.5 mw, and the installation cost decreases to $95/kw.

Lowest Operating Cost. The complete plant may be remotely operated, minimizing cost of operating labor.

$50/kw **Lowest Transmission Cost.** The flexibility of location of this power plant can lower transmission investment as much as $50/kw.

COMPLETE PEAKING PLANTS AVAILABLE FROM WESTINGHOUSE

Westinghouse can supply complete peaking service from Powercasting planning to the resulting plant.

Westinghouse will coordinate the entire plant . . . will supply gas turbine, generator, switchgear, controls, regulating equipment and even the buildings themselves. In addition, of course, Westinghouse can supply transformers, power circuit breakers and all other apparatus for your system.

Let us prove to you that Westinghouse gas turbine peaking plants can help save you significant capital in the expansion of your system. Call your Westinghouse representative, or write Westinghouse Electric Corporation, P.O. Box 868, Pittsburgh 30, Pa. J-50616

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Automatic Dispatch System Provides Economic Loading

(*Continued from page* 92)

The rate of response to loading change directives is selective over a pre-set response range designated in megawatts per minute. The adjustable rates are termed high, medium and low and are represented on the console by a three-position switch. For normal operation, the switches are in the medium position and represent a rate of response from 1 to 8½ Mw per min for the units under control.

The station console is also equipped with high and low limit setters, calibrated in megawatts. These act as barriers to control action which would tend to drive the generation on a unit above or below certain operating limits. For example, the low limit setter marks the minimum load point on a unit, and the high setter marks the point where another mill, fan or pump must be brought into service for additional generation. Alarms are set to announce that control action has taken unit loading to a limit.

The frequency bias setter permits an otherwise rigid cost-megawatt system to deviate from a fixed control to the extent that a pre-calculated contribution to frequency regulation can be obtained. In other words, the benefit of free-governor action is preserved. Each console is equipped with a frequency base dial, calibrated in cps, and a frequency bias dial, calibrated in megawatts per one-tenth cycle.

The base dial is normally set at 60 cps. At times it is operationally desirable to hold frequency at a level above or below the 60-cps point on an interconnection level. The base dial is then changed to a new base position and left there for the duration of the period of ± 60-cps regulation requested.

The bias setter for each unit is set at a predetermined point in megawatts per one-tenth cycle deviation. This will permit the governor control action of the unit to react to frequency base deviation within the set bias band. At present, the bias setters are positioned to allow free governor action amounting to 1½% of the capability of each unit under control. For example, a 100-Mw unit will contribute to regulation to the extent of 1½-Mw per one-tenth cycle of frequency deviation.

It is felt that this method provides the man responsible for load supervision with a tool with advantages over the manual method. Formerly, a change in the loading level of the controlled stations had to be channeled to the control room operator through a minimum of two telephone calls. This is time consuming and subject to error.

A majority of the men who operate the stations agree that the automatic system has fit in well with the complexities of plant operation. There are exceptions to this attitude. It is considered by some that combustion control of stoker-fired boilers requires closer supervision when they are supplying energy to an automatically controlled turbine than is required when the same turbine is controlled manually.

Colorado Administration Wants Fryingpan-Arkansas

Colorado state administration officials urged Congress to approve the Fryingpan-Arkansas Irrigation and Power Project. The testimony was given to a House Interior Subcommittee, which revived the long-dormant project just ahead of adjournment of Congress.

Though the testimony was mostly in favor, there was little doubt that Congress will go home again without acting on the combination reservoir, tunnel and power project that would move water from the western slope to the eastern slope of Colorado.

The $170-million project is "economically justified and financially feasible," said Fred G. Aandahl, assistant secretary of the interior. He was supported by William I. Palmer, assistant commissioner of reclamation. He said the project had wider support than previously because a proposed reservoir on the Roaring Fork has been dropped. The same function of making diversions of water from the Colorado to the Arkansas River possible, Palmer said, "can be served with a reservoir at the Ruedi site on the Fryingpan River."

As now planned, the project

would cost about $170-million, generate 469-million kwhr of power annually, have a power capacity of about 105,000 kw. It would consist of several dams on Colorado's western slope (near Aspen) to impound heavy water runoffs, and transfer the water by tunnel eastward through the continental divide into the Arkansas River Basin near Leadville.

Will Appeal Ohio Decision On Findlay Rate Base Case

A recent Ohio Supreme Court decision in an Ohio Fuel Gas Co case in Findlay, Ohio, is expected to be used as a weapon by those Ohio officials and legislators seeking to change the present utility rate base formula. An attempt led by Gov Michael B. DiSalle to get the formula changed was unsuccessful.

In the decision of the Ohio Supreme Court, by a 5-2 vote, the Ohio Fuel Gas Co was granted its request that the PUC reconsider its action increasing the Findlay rate by about $65,000 a year. This was less than half the $150,000 the gas company had requested.

Ohio PUC, filing an application for a rehearing and reconsideration by the Ohio Supreme Court, made two points: "The court had transcended the power legally conferred on it, and:

"The majority opinion . . . violates the 14th amendment of the US Constitution in that it authorizes the fixation of rates which will yield more than sufficient (revenue) to meet the interest obligations of Ohio public utilities . . ."

The core of the gas company-Findlay case centers around the question of whether the company should be permitted to include in its rate base the amount of interest it actually pays on its outstanding bonds, or whether it should be permitted to include interest against the total value of the property purchased with the bonds.

The present legal formula governing utility rates requires the PUC to grant a utility a reasonable rate of return on a rate base that is calculated by figuring the cost of reproducing the firm's plant and equipment new and subtracting depreciation.

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To design & prepare plans, specs & estimates of cost for constr or maint of elec systems for Dept of Pub Wks. Accred degree in elec engrg; 3 yrs fld & ofc exper. $7086—$8382 annually; sound pension system incl. soc. security; lib. pd holdy & vac. Formal appl. must be on file by 4 PM August 3, 1960. MILWAUKEE COUNTY CIVIL SERVICE COMMISSION, Room 206, Courthouse, Milwaukee 3, Wis.

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3—500 KVA G-E 22000—2300/4000Y
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1	5000	West.	115,000—13,750, 3 Ph.
1	10000	West.	67,000—34,500, 3 Ph. Auto.
1	3750	G.E.	69,300—13,200, 3 Ph.
1	3000	G.E.	69,000—4340, 3 Ph.
3	500	G.E.	66,000/33,000—2300/13200
1	2500	Mol.	44,000—2400/4160, 3 Ph.
2	2500	Wagner	45,800/22,900—4160Y, 3 Ph.
3	200	West.	44,000—480
1	5000	West.	34,500—13750/6875, 3 Ph.
1	4500	West.	33,000—2500/4330, 3 Ph.
2	3000	Upgf.	34,750—4160, 3 Ph.
1	2000	Kuhl.	34,650—440, 3 Ph.
2	1500	G.E.	34,400—2520, 3 Ph.
3	1250	A.C.	33,000—480
3	500	Mol.	34,500—2300/4600
3	200	A.C.	34,500—2400/7200/12470Y
3	200	Wagner	34,500—240
2	3000	G.E.	26,400—4160Y/2400, 3 Ph.
3	1250	G.E.	29,340—2500
2	3000	G.E.	13,800—2640, 3 Ph.
1	2500	G.E.	13,800—2400, Unit Sub.
1	600	Stand.	13,200—2300, 3 Ph.
1	450	Penna.	13,200—2400, 3 Ph. Askarel
3	333	G.E.	13,200/22,800Y—2420/4190Y
3	100	G.E.	7,200—240/480
3	100	A.C.	6,900—2400
1	500	Kuhl.	4,800—480, 3 Ph.
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1	1000	A.C.	2,400/4,160—240, 3 Ph.
3	400	G.E.	2,300/4,000—230/460

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1	750	G.E.	13,200 V. 360 A. STEP
1	500	G.E.	4,160 V. 694 A. STEP
1	375	G.E.	34,500 V. 502 A. STEP
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The Meetings Calendar

JUNE

First Congress International Federation of Automatic Control—Moscow, USSR, June 25-July 9.

Canadian Electrical Association—Annual Convention, Manior Richelieu, Murray Bay, Quebec, June 27-29.

National Association of Power Engineers—Annual Convention, Jack Tar Hotel, San Francisco, June 27-30.

JULY

Edison Electric Institute—Industrial Relations Committee Joint with Rocky Mountain Electrical League, Denver Hilton Hotel, Denver, Colo., July 21-22.

AUGUST

American Institute of Electrical Engineers—Pacific General Meeting, El Cortez Hotel, San Diego, Aug. 8-12.

Heat Transfer Conference & Exhibit—Sponsored by ASME and AICE, Statler-Hilton Hotel, Buffalo, Aug. 15-17.

Summer Institute—Principles of Nondestructive Testing, Sacramento State College, August 15-26.

Western Electronics Show & Convention—Los Angeles Memorial Sports Arena, Los Angeles, Aug. 23-26.

SEPTEMBER

Southeastern Electric Exchange — Personnel Administration Section, Roanoke Hotel, Roanoke, Virginia, Sept. 1-2; Accounting Conference, Tides Hotel, St. Petersburg, Florida, Sept. 29-30.

Association of Illinois Electric Cooperatives—Annual Meeting, St. Nicholas Hotel, Springfield, Sept. 7-9.

Northwest Electric Light & Power Association—53rd Annual Meeting, Glacier Park Lodge, Glacier, Mont., Sept. 7-9.

•**Joint Automatic Control Conference**—Sponsored by ISA, ASME, AIEE, IRE, AIChE, Massachusetts Institute of Technology, Cambridge, Mass., Sept. 7-9.

Rocky Mountain Electrical League—Annual Fall Conference, Hilton Hotel, Denver, Colo., Sept. 7-10.

American Society of Mechanical Engineers—International Air Pollution Congress, Statler-Hilton Hotel, New York City, Sept. 10-11.

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